

5. WATER QUALITY OF GALVESTON BAY

The derivative data bases for each of the study parameters formed the basis for characterization of water quality in Galveston Bay. This characterization entails both the spatial dimension and the temporal, the latter including the analysis of trends in time.

Tables 3-7, 3-8 and 3-9 summarized the data record in Galveston Bay, including summary statistics for the bay as a whole. These statistics, which were based upon unscreened data (and therefore may be of eroded accuracy due to spurious entries), in any event take no account of the considerable variation within the bay. In order to better delineate the spatial variation of water quality parameters, it is necessary to aggregate the data according to position. The data record for each parameter was sorted into two different segmentations of the bay: the Texas Water Commission Water Quality segments, and the hydrographic segments developed for this project. Both segmentation systems are described in Chapter 2, and the specific defining quadrilaterals are given in the Appendix, Tables A-4 and A-5. The purpose of segmentation is to assist in defining spatial distributions in the bay. As emphasized in Section 2.1, any such segmentation is based upon the assumption that each segment is homogeneous, within an allowable scatter in the data (i.e., within a certain statistical confidence), and data from that segment can be considered independent measurements of the same variate. Such an approach is necessary because of the sparsity of the data record in Galveston Bay.

The differences between the TWC and hydrographic segmentations are:

- (1) The TWC segments tend to be larger in space, especially within the open bay, and generally have arbitrary or political boundaries;
- (2) The hydrographic segments are smaller in spatial extent and are defined by principal geomorphic controls on flow and/or known predominant flow patterns;
- (3) The TWC segments include tributaries of the principal inflows but exclude the Gulf of Mexico;
- (4) The hydrographic segments focus upon the bay system *per se*, its immediate periphery, and the nearshore Gulf of Mexico, but do not consider the upper reaches of the tributaries;

Analysis by TWC segments, which was specified by the GBNEP Management Conference as a requirement of this study, has the advantages of: (a) treating a smaller number of segments, (b) corresponding to the administrative framework for Galveston Bay, and therefore allowing direct comparison with standards and past surveys. On the other hand, analysis by hydrographic segments allows: (a) better spatial definition of variability, especially in the open bay, and (b) more realistic definition of areas that are nearly homogeneous, i.e., based upon

hydrographic controls rather than political boundaries or convenience of access, therefore greater precision in the analyzed data.

One must realize that Galveston Bay is under-sampled, relative to the time and space scales of natural variability. Therefore, any partitioning of the data in space or time involves trade-offs in statistical confidence. The more segments that are defined (i.e., the smaller their spatial extent), the fewer data points that will be placed in each segment. While spatial variability is better delineated, the statistical confidence in the values at each segment is reduced because of the fewer number of data points. To improve the number of data points by aggregating into larger segments is to introduce more "noise" in the data due to spatial variability; the ultimate extreme of this strategy is the baywide analysis given in Tables 3-7 through 3-9, in which all available data are used to compute the statistics, but the high variance renders the computed statistics practically useless. The hydrographic segmentation developed in this study, in which the bay system and periphery are subdivided into 141 segments, represents our best compromise between a sufficient data record in each segment for meaningful analyses and a sufficiently small and well-defined segment domain so as to reduce the spatially-induced noise. Even at this, as shown by the sampling density maps of Figs. 3-10 *et seq.*, some of the segments are so undersampled for most parameters as to be indeterminate.

As a preliminary to this analysis, Table 5-1 summarizes the principal water quality parameters and a nominal estimate of the uncertainty of measurement of each. These were developed from the data of Tables A-1 and A-6 in the appendices, which in turn were compiled from a study of current and historical laboratory procedural accuracy and precision data. Reference is made to the discussion of uncertainty in Section 4.2.3. The nominal uncertainty is given in Table 5-1 as a standard deviation, expressed as a fraction of the measurement (based upon typical values in Galveston Bay when the standard deviation does not vary directly with parameter value). While establishment of the uncertainty for most of the parameters of Table 5-1 is based upon a relatively small sampling of lab intercomparisons, and is therefore subject to considerable uncertainty itself, it is apparent from the data of this table that most parameters are not measured with a high level of accuracy. Recall that the associated confidence bounds for a high probability are two or three times the standard deviation, the latter corresponding to the intuitive notion of tolerance. Thus, a measurement of ammonia establishes a 98%-probable value nominally within $\pm 60\%$ of the measurement. This translates to an additional, and in many cases considerable, source of variation in the data.

The historical statistics for each of the study parameters, for each of the TWC segments and each of the hydrographic segments, are presented in Appendix B. For each parameter there is a pair of tables, the first, the Period of Record Statistics, presenting basic data on magnitude and variance of the measurements, and the second, the Time Trend Analysis, presenting data on the time history dimension of the parameter's variation. These tables, and their companions on sediment quality, are the central product of this study and warrant examination far beyond the comments offered here. However, because of

the considerable volume of the tables and the fact that most readers will not wish to delve into the details of the analyses, these results are relegated to the appendix.

Tables 5-2 through 5-5 present two examples of these analyses, for the hydrographic segmentation. In these tables the first key entry is in the second column of the first table, *viz.* number of observations. This number obviously circumscribes the confidence of the remainder of the analyses for that segment: for many segments this number is zero, or is so small as to provide little useful information. For the hydrographic segments, segments with zero data are omitted from the table in order to conserve space, but for the TWC segments, all segments are presented, even those segments with zero observations. Figures 3-10 through 3-34 depict the distribution of sampling intensity in Galveston Bay (by hydrographic segment) for key study parameters. Particular note should be made of the paucity of measurements of metals and organics.

It will be recalled (Section 3.3.1) that we have elected to treat measurements below detection limits (BDL) in three different ways. First, all such data are ignored. This is done in all computations of *variability*, including standard deviations and regressions, as well as in the first average (column three) of Tables 5-2 *et seq.* Second, all BDL's are assigned a value of zero, the more optimistic extreme, assuming a BDL is equivalent to nonpresence of the analyte. Third, all BDL's are assigned the value of the corresponding detection limits, the more pessimistic extreme, assuming a BDL variate is present to the maximum concentration that remains undetectable. The separate averages using these latter two strategies are given in the final two columns of the Period of Record Statistics tables (e.g., Table 5-2 and 5-4). These represent upper and lower bounds on the actual mean concentration. Because many of the data records contain a high frequency of BDL values, and (worse) reported values of 0 instead of a detection limit, a census of BDL's, minimum values, and non-zero minima is also given in the Period of Record Statistics tables.

TABLE 5-1
 NOMINAL UNCERTAINTY IN MEASUREMENT OF
 WATER QUALITY PARAMETERS
 (See Table 3-11 for definition of abbreviations)

<i>abbreviation</i>	<i>units</i>	<i>nominal standard deviation (as percentage of value)</i>
<i>Conventional Parameters</i>		
WQTEMP	degrees Celsius	1
WQSAL	parts per thousand	1
WQDO	mg/L	2
WQDODEF	mg/L	5
WQPH	pH units	5
WQTURB	NTU, JTU	10
WQXTSS	mg/L	10
WQAMMN	mg/L	20
WQORGN	mg/L	20
WQKJLN	mg/L	20
WQNO3N	mg/L	25
WQTOTP	mg/L	15
WQVOLS	mg/L	10
WQVSS	mg/L	20
WQO&G	mg/L	10
WQTOC	mg/L	10
WQXBOD5	mg/L	20
WQCHLA	µg/L	20
WQTCOLI	org/100 mL	200
WQFCOLI	org/100 mL	200
<i>Metals</i>		
WQMETAST	µg/L	35
WQMETASD	µg/L	35
WQMETBAT	µg/L	15
WQMETBAD	µg/L	25
WQMETB	µg/L	25
WQMETCDT	µg/L	15
WQMETCDD	µg/L	20
WQMETCRT	µg/L	100
WQMETCRD	µg/L	100
WQMETCUT	µg/L	25

TABLE 5-1
(continued)

<i>abbreviation</i>	<i>units</i>	<i>nominal standard deviation (as percentage of value)</i>
<i>Metals (continued)</i>		
WQMETCUD	µg/L	100
WQMETFET	µg/L	20
WQMETFED	µg/L	100
WQMETPBT	µg/L	10
WQMETPBD	µg/L	20
WQMETMNT	µg/L	100
WQMETMND	µg/L	35
WQMETHGT	µg/L	40
WQMETHGD	µg/L	40
WQMETNIT	µg/L	20
WQMETNID	µg/L	30
WQMETSET	µg/L	50
WQMETSED	µg/L	50
WQMETAGT	µg/L	50
WQMETAGD	µg/L	50
WQMETZNT	µg/L	15
WQMETZND	µg/L	100
<i>Organics</i>		
WQ-ABHC	µg/L	10
WQ-LIND	µg/L	10
WQ-XDDT	µg/L	10
WQ-ALDR	µg/L	5
WQ-CHLR	µg/L	15
WQ-DIEL	µg/L	5
WQ-ENDO	µg/L	25
WQ-ENDR	µg/L	5
WQ-TOXA	µg/L	30
WQ-HEPT	µg/L	5

TABLE 5-1
(continued)

<i>abbreviation</i>	<i>units</i>	<i>nominal standard deviation (as percentage of value)</i>
<i>Organics (continued)</i>		
WQ-MTHX	µg/L	5
WQ-PCB	µg/L	25
WQ-MALA	µg/L	35
WQ-PARA	µg/L	10
WQ-DIAZ	µg/L	20
WQ-MTHP	µg/L	10
WQ-24D	µg/L	10
WQ-245T	µg/L	10
WQ-PAH	µg/L	20

TABLE 5-2
Period of Record Statistics for Hydrographic Segments
WQAMMN

Segment	No. of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
C1	105	0.407	0.44	89	84.8	0.01	760916	0.01	760916	2.3	820120	0.345	0.394
C2	174	0.157	0.24	137	78.7	0	720229	0.01	750525	1.2	890329	0.124	0.126
C5	190	0.29	0.42	168	88.4	0	720127	0.01	760525	2.7	700114	0.257	0.258
C6	10	0.123	0.033	10	100.	0.08	870708	0.08	870708	0.19	880524	0.123	0.123
D1	85	0.318	0.37	74	87.1	0.01	760407	0.01	760407	1.6	740710	0.277	0.317
D2	45	0.202	0.3	25	55.6	0.01	820524	0.01	820524	1.4	750116	0.112	0.251
D4	108	0.547	1.1	84	77.8	0	711124	0.01	760714	7.3	750116	0.426	0.463
E1	58	0.0302	0.047	58	100.	0	691202	0.02	831128	0.3	700414	0.0302	0.0302
E2	140	0.11	0.25	115	82.1	0	680716	0.01	760226	1.3	890419	0.0902	0.101
E3	57	0.0549	0.064	57	100.	0	801104	0.01	781012	0.34	770202	0.0549	0.0549
E5	6	0.348	0.073	6	100.	0.27	820428	0.27	820428	0.46	840816	0.348	0.348
E6	2	0.32	0.02	2	100.	0.3	840816	0.3	840816	0.34	820428	0.32	0.32
E8	14	0.645	0.17	11	78.6	0.34	840816	0.34	840816	0.87	820428	0.507	0.518
E9	7	0.841	1	7	100.	0.32	820428	0.32	820428	3.4	820428	0.841	0.841
E10	7	0.371	0.15	7	100.	0.23	840816	0.23	840816	0.72	840816	0.371	0.371
G1	52	1	1.1	49	94.2	0	680716	0.4	690819	5.3	700210	0.943	0.948
G2	64	0.271	0.37	58	90.6	0	740221	0.01	760804	2.1	731105	0.245	0.248
G3	105	0.0934	0.16	86	81.9	0	721018	0.01	760525	1.1	890403	0.0765	0.0786
G4	51	0.0935	0.15	48	94.1	0	680716	0.1	690218	0.5	700414	0.088	0.0929
G5	103	0.196	0.38	99	96.1	0	680716	0.01	781010	2.5	700210	0.189	0.192
G6	83	0.0807	0.11	77	92.8	0	680716	0.015	841212	0.44	890403	0.0749	0.0797
G7	182	0.0954	0.22	160	87.9	0	680716	0.01	760226	1.6	740821	0.0839	0.087
G8	7	0.04	0.029	6	85.7	0.02	760719	0.02	760719	0.09	760719	0.0343	0.0414
G9	114	0.0369	0.057	108	94.7	0	680716	0.01	770824	0.29	810414	0.035	0.0385
G10	32	0.099	0.089	31	96.9	0.02	840711	0.02	840711	0.35	850227	0.0959	0.0966
G12	63	0.091	0.093	63	100.	0	801105	0.01	801105	0.52	780208	0.091	0.091
G14	31	0.088	0.088	30	96.8	0	791108	0.01	780606	0.4	810414	0.0852	0.0868
G15	205	0.785	1	200	97.6	0	680716	0.01	850430	5.7	700414	0.766	0.768
G16	171	0.251	0.41	162	94.7	0	680716	0.01	850430	1.9	700310	0.237	0.24

TABLE 5-2
(continued)
WQAMMN Period of Record Statistics

Segment	No. of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
G17	5	0.448	0.25	5	100.	0.24	830627	0.24	830627	0.8	800804	0.448	0.448
G18	388	0.114	0.25	328	84.5	0	680716	0.01	750525	2.1	690819	0.096	0.102
G19	30	0.00893	0.046	28	93.3	0	710316	0.25	830627	0.25	830627	0.00833	0.0117
G20	109	0.0197	0.076	88	80.7	0	680716	0.13	690114	0.4	700310	0.0159	0.0273
G21	1	0	0	0	0.	0	0	0	0	0	0	0	0.05
G22	43	0.231	0.31	40	93.	0.01	870423	0.01	870423	1.6	820126	0.215	0.215
G23	4	0.0525	0.056	4	100.	0.02	760719	0.02	760719	0.15	810524	0.0525	0.0525
G24	208	0.151	0.31	198	95.2	0	680716	0.01	800424	2.4	690218	0.144	0.145
G25	39	0.0836	0.085	39	100.	0	801105	0.01	800424	0.32	761213	0.0836	0.0836
G26	84	0.0567	0.06	84	100.	0	800424	0.01	761118	0.37	770426	0.0567	0.0567
G27	31	0.0513	0.063	31	100.	0.02	840330	0.02	840330	0.33	770426	0.0513	0.0513
G28	2	0.03	0	2	100.	0.03	760719	0.03	760719	0.03	760719	0.03	0.03
G29	93	0.0405	0.053	92	98.9	0.01	791106	0.01	791106	0.5	820526	0.0401	0.0406
G30	64	0.0586	0.25	58	90.6	0	680716	0.1	690415	1.8	700113	0.0531	0.0594
G31	59	0.0385	0.028	59	100.	0.01	761021	0.01	761021	0.11	810415	0.0385	0.0385
G32	117	0.0975	0.27	103	88.	0	680716	0.01	760226	1.3	690923	0.0858	0.09
G33	19	0.209	0.14	18	94.7	0	750425	0.01	750806	0.37	840816	0.198	0.201
G34	31	0.111	0.2	29	93.6	0.01	760721	0.01	760721	0.95	811103	0.104	0.107
G35	48	0.0528	0.055	47	97.9	0.02	750417	0.02	750417	0.27	860225	0.0517	0.0519
G36	136	0.00975	0.049	120	88.2	0	680716	0.01	750506	0.5	831116	0.0086	0.0157
G37	41	0.344	1.3	34	82.9	0.01	820427	0.01	820427	7.8	801211	0.285	0.291
G38	6	0.82	0.71	3	50.	0.16	851215	0.16	851215	1.8	801211	0.41	0.443
H1	364	0.383	0.54	310	85.2	0	720614	0.01	770214	4	741015	0.327	0.404
H2	61	0.504	0.66	58	95.1	0	730214	0.01	760818	3.4	730911	0.479	0.481
H3	25	0.955	1	23	92.	0	740214	0.03	820804	4	731115	0.878	0.881
H4	55	0.426	0.67	49	89.1	0	740214	0.01	760818	2.6	731115	0.38	0.381
H5	67	0.656	0.69	65	97.	0.017	831013	0.017	831013	3	731115	0.637	0.637
H7	198	1.35	1.4	188	95.	0	690114	0.03	840711	7.2	700707	1.29	1.29
H8	66	0.75	0.77	64	97.	0.029	830426	0.029	830426	3.7	731115	0.727	0.728

TABLE 5-2
(continued)
WQAMMN Period of Record Statistics

Segment	No. of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL	
175	H10	66	0.699	0.72	61	92.4	0.01	880727	0.01	880727	3	731115	0.646	0.647
	H11	415	1.37	1.6	388	93.5	0	681119	0.01	860911	11	750415	1.28	1.33
	H12	12	0.93	0.78	10	83.3	0.03	840711	0.03	840711	2.5	760512	0.775	0.781
	H13	324	1.29	1.2	315	97.2	0.012	820519	0.012	820519	6.8	731115	1.26	1.28
	H14	254	4.02	2.6	251	98.8	0	681119	0.1	681015	23	680716	3.97	3.97
	H15	343	2.09	1.8	339	98.8	0	740813	0.012	820519	9.6	731210	2.07	2.08
	H16	132	4.4	2.5	132	100.	0.64	840711	0.64	840711	13	690715	4.4	4.4
	H17	835	2.97	2.3	831	99.5	0.01	820519	0.01	820519	22	830125	2.96	2.96
	H18	44	2.46	1.6	40	90.9	0.76	770503	0.76	770503	7.9	800129	2.23	2.36
	H19	494	3.34	3.1	492	99.6	0	681210	0.012	820519	39	750120	3.32	3.33
	H20	420	2.09	2.5	410	97.6	0.01	760220	0.01	760220	18	811118	2.04	2.07
	M3	11	0.0214	0.016	7	63.6	0.01	750610	0.01	750610	0.05	750416	0.0136	0.0282
	S1	111	3.66	1.9	102	91.9	0.1	690415	0.1	690415	7.8	700210	3.36	3.36
	T2	118	0.2	0.41	104	88.1	0	680820	0.01	760224	2.4	740905	0.177	0.182
	T3	105	0.275	0.48	100	95.2	0	710316	0.001	870409	3.5	710817	0.262	0.262
	T5	149	0.0937	0.25	129	86.6	0	680716	0.01	760224	1.1	700113	0.0812	0.0861
	T6	109	0.0628	0.09	100	91.7	0	680820	0.01	761229	0.5	700210	0.0576	0.0627
	T8	7	0.146	0.14	7	100.	0	760225	0.02	751015	0.4	760128	0.146	0.146
	T9	137	0.163	0.22	118	86.1	0	720402	0.01	760712	1.2	740103	0.141	0.161
	T10	36	0.0306	0.12	36	100.	0	691202	0.1	700210	0.7	700414	0.0306	0.0306
	T11	85	0.0275	0.049	77	90.6	0	680716	0.01	761229	0.3	880816	0.0249	0.0303
	T12	81	0.0891	0.15	81	100.	0	691202	0.01	760719	0.7	700113	0.0891	0.0891
	T13	8	0.0675	0.044	8	100.	0.01	761118	0.01	761118	0.15	810505	0.0675	0.0675
	T15	2	0.1	0	2	100.	0.1	810408	0.1	810408	0.1	810408	0.1	0.1
	T17	1	0.1	0	1	100.	0.1	810408	0.1	810408	0.1	810408	0.1	0.1
	W1	27	0.308	0.4	22	81.5	0	711230	0.01	760303	1	740828	0.251	0.291
	W2	70	0.189	0.32	47	67.1	0.01	760303	0.01	760303	1	740828	0.127	0.132
	W3	2	0.2	0	2	100.	0.2	810714	0.2	810714	0.2	810714	0.2	0.2
	W4	163	0.0268	0.036	154	94.5	0	680716	0.01	770824	0.29	870129	0.0253	0.0285

TABLE 5-2
(continued)
WQAMMN Period of Record Statistics

Segment	No.of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
W5	19	0.584	0.54	15	79.	0.01	760226	0.01	760226	1.8	740529	0.461	0.466
W6	77	0.0757	0.21	69	89.6	0	680716	0.09	711230	1.4	700113	0.0678	0.0738
W7	102	0.159	0.27	92	90.2	0	721019	0.01	760303	1.1	840131	0.144	0.145
W8	83	0.171	0.26	62	74.7	0	730523	0.01	760819	1.5	711127	0.128	0.214
W9	30	0.0233	0.011	30	100.	0.02	831128	0.02	831128	0.08	870617	0.0233	0.0233
W10	217	0.0658	0.17	177	81.6	0	680716	0.01	760226	1	740819	0.0536	0.0635
W11	57	0.0494	0.036	57	100.	0	791107	0.01	770824	0.15	790523	0.0494	0.0494
W12	12	0.195	0.12	8	66.7	0.07	880707	0.07	880707	0.49	820111	0.13	0.133
W13	2	0.15	0	2	100.	0.15	810331	0.15	810331	0.15	810331	0.15	0.15
W14	23	0.0917	0.12	22	95.7	0.01	841218	0.01	841218	0.61	890613	0.0877	0.0886
W15	85	0.0892	0.16	59	69.4	0	711228	0.002	810909	0.91	700114	0.0619	0.0655
W16	405	0.0732	0.22	340	84.	0	680716	0.01	760204	2	740805	0.0614	0.0659
W18	127	0.501	0.63	121	95.3	0	720228	0.007	810909	4.3	690924	0.478	0.478
W19	126	0.147	0.29	109	86.5	0	680716	0.01	760824	1.4	740819	0.127	0.133
W20	5	0.18	0.024	5	100.	0.15	810331	0.15	810331	0.2	810331	0.18	0.18
W21	114	0.227	0.59	85	74.6	0	740304	0.01	760609	4.1	741104	0.169	0.173

Table 5-3
Time Trend Analysis for Hydrographic Segments:
WQAMMN

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time				95% confidence limits on slope	
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
C1	730919 900910	730919	900910	5.2	-0.0281	0.64	0.417	90.5%	-0.046	-0.0097
C2	720229 901210	720229	901210	7.3	-0.00543	0.21	0.239	98.7%	-0.014	0.0027
C5	690730 901210	690730	901210	7.9	-0.0267	0.56	0.388	86.9%	-0.037	-0.016
C6	810524 880526	810524	880526	1.4	0.00216	0.11	0.0328	96.1%	-0.0066	0.011
D1	671001 900710	671001	900710	3.2	-0.0158	0.55	0.365	95.6%	-0.033	0.0013
D2	700923 900710	700923	890731	1.3	-0.0185	0.35	0.285	87.2%	-0.039	0.0023
D4	701130 900815	701130	900815	4.3	-0.0537	0.88	1.05	93.%	-0.096	-0.011
E1	691202 890706	691202	890706	3	-0.000264	0.033	0.0473	99.8%	-0.0019	0.0013
E2	680716 901008	680716	900712	5.2	0.00476	0.075	0.245	98.1%	-0.0015	0.011
E3	761021 890706	761021	890706	4.5	-0.0042	0.082	0.0613	92.6%	-0.0082	-0.00023
E5	820428 840816	820428	840816	2.6	0.0565	0.28	0.0335	21.%	0.016	0.097
E6	820428 840816	820428	840816	0.87	-0.0174	0.34	0	0.%	0	0
E8	820428 840816	820428	840816	4.8	-0.139	0.76	0.0733	18.6%	-0.19	-0.089
E9	820428 820428	820428	820428	7						
E10	820428 840816	820428	840816	3	0.063	0.33	0.138	81.6%	-0.09	0.22
G1	680716 701020	680716	701020	22	0.415	0.53	1.03	93.6%	-0.045	0.87
G2	731105 900719	731105	900719	3.5	-0.0374	0.59	0.327	76.4%	-0.055	-0.02
G3	721018 900618	721018	900402	4.9	0.00223	0.07	0.155	99.5%	-0.0044	0.0089
G4	680716 701020	680716	701020	21	0.0426	0.043	0.152	96.9%	-0.026	0.11
G5	680716 890705	680716	890705	4.7	-0.0136	0.3	0.364	92.4%	-0.023	-0.0041
G6	680716 900402	680716	900402	3.5	0.00461	0.042	0.0998	85.7%	0.002	0.0072
G7	680716 901113	680716	901113	7.2	-0.000107	0.096	0.218	100.%	-0.0055	0.0052
G8	760719 840330	760719	760724	440	-0.487	0.043	0.0287	98.7%	-6.3	5.3
G9	680716 890706	680716	890706	5.1	0.00111	0.027	0.0568	98.%	-0.00039	0.0026
G10	831214 890705	831214	890705	5.6	-0.0151	0.14	0.0857	92.1%	-0.034	0.0039
G12	760719 890705	760719	890705	4.9	-0.00814	0.14	0.0857	85.3%	-0.013	-0.0032

Table 5-3
(continued)
WQAMMN Time Trend Analysis

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
G14	761021 840330	761021	830627	4.5	0.00847	0.067	0.0867	96.5%	-0.0086	0.026
G15	680716 900618	680716	900402	9.2	-0.0576	1.2	0.928	81.3%	-0.075	-0.041
G16	680716 900618	680716	900402	7.5	-0.0141	0.36	0.39	91.9%	-0.021	-0.0067
G17	800804 830627	800804	830627	1.7	-0.174	0.75	0.0318	1.6%	-0.22	-0.13
G18	680716 901210	680716	901210	15	-0.00204	0.14	0.248	99.6%	-0.0054	0.0014
G19	710316 840330	710316	830627	2.3	0.0208	-0.011	0.00694	2.2%	0.02	0.022
G20	680716 840330	680716	701020	39	0.0185	-0.0029	0.0746	97.4%	-0.0058	0.043
G21	840330 840330	0	0	0						
G22	790717 900711	790717	900711	3.6	-0.0219	0.35	0.297	94.2%	-0.05	0.0064
G23	760719 810524	760719	810524	0.83	0.0268	0.02	0.00015	0.%	0.027	0.027
G24	680716 900618	680716	900402	9.1	-0.0105	0.27	0.305	94.2%	-0.017	-0.0045
G25	761021 820427	761021	820427	7.1	-0.00714	0.097	0.0842	97.8%	-0.023	0.0082
G26	760719 890705	760719	890705	6.5	-0.00472	0.082	0.0568	89.9%	-0.0078	-0.0016
G27	770426 890705	770426	890705	2.5	-0.0103	0.14	0.0514	67.%	-0.016	-0.0049
G28	760719 760724	760719	760724	150	0	0.03	0	0.%	0	0
G29	760719 890706	760719	890706	7.1	-0.00336	0.066	0.0513	93.5%	-0.006	-0.00069
G30	680716 720425	680716	720425	15	0.00823	0.045	0.246	99.9%	-0.055	0.071
G31	760719 890706	760719	890706	4.6	-0.00207	0.051	0.0266	89.8%	-0.0037	-0.00046
G32	680716 901008	680716	901008	4.6	0.000938	0.091	0.269	99.9%	-0.0062	0.008
G33	750425 840816	750425	840816	1.9	0.0354	0.023	0.0354	6.7%	0.03	0.04
G34	760719 840816	760719	831116	4	0.0613	0.05	0.149	54.9%	0.035	0.088
G35	750411 890706	750411	890706	3.3	-0.00384	0.082	0.0506	85.%	-0.0065	-0.0011
G36	680716 831116	680716	831116	7.8	0.0156	-0.026	0.0346	50.4%	0.013	0.018
G37	801211 901113	801211	901113	3.4	-0.172	1.2	1.23	86.6%	-0.32	-0.019
G38	801211 851215	801211	851215	0.6	-0.198	1.2	0.531	56.4%	-3.1	2.7
H1	720210 900711	720210	900711	17	-0.0405	0.75	0.496	85.3%	-0.052	-0.029

Table 5-3
(continued)
WQAMMN Time Trend Analysis

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
H2	730214 900711	730214	900711	3.3	-0.0713	1.1	0.566	72.4%	-0.1	-0.041
H3	730911 850227	730911	850227	2	-0.197	1.6	0.894	72.8%	-0.34	-0.051
H4	730911 900828	730911	900828	2.9	-0.0639	0.93	0.572	73.3%	-0.094	-0.033
H5	730911 900711	730911	900711	3.9	-0.0892	1.4	0.518	57.2%	-0.11	-0.063
H7	680716 850227	680716	850227	11	-0.136	2.1	1.22	78.3%	-0.17	-0.098
H8	730911 900711	730911	900711	3.8	-0.0915	1.5	0.634	67.6%	-0.12	-0.058
H10	730911 900711	730911	900711	3.6	-0.0777	1.3	0.616	72.5%	-0.11	-0.045
H11	671001 900813	671001	900813	17	-0.143	2.8	1.23	63.%	-0.16	-0.12
H12	760512 850227	760512	850227	1.1	-0.185	1.7	0.395	25.7%	-0.27	-0.096
H13	720210 900711	720210	900711	17	-0.129	2.4	1.03	69.6%	-0.15	-0.11
H14	680716 850227	680716	850227	15	-0.212	4.5	2.5	94.3%	-0.32	-0.1
H15	720210 900813	720210	900813	18	-0.182	3.6	1.52	73.4%	-0.21	-0.15
H16	680716 850227	680716	850227	7.9	-0.237	5.1	2.24	82.8%	-0.33	-0.15
H17	680716 900813	680716	900813	38	-0.147	4.6	2.14	84.9%	-0.17	-0.12
H18	760609 850227	760609	850227	4.6	-0.0836	2.8	1.58	98.1%	-0.27	0.11
H19	680716 900711	680716	900711	22	-0.195	5.2	2.87	84.5%	-0.24	-0.15
H20	751201 900813	751201	900813	28	-0.254	3.8	2.2	75.6%	-0.3	-0.21
M3	750416 831116	750416	750610	46	-0.246	0.047	0.00571	13.5%	-0.36	-0.13
S1	680716 850227	680716	850227	6.1	-0.0979	3.8	1.89	99.1%	-0.31	0.11
T2	680820 811209	680820	811209	7.8	-0.00307	0.22	0.411	99.9%	-0.023	0.017
T3	710316 900809	710316	900809	5.2	-0.00643	0.33	0.476	99.4%	-0.023	0.011
T5	680716 900809	680716	900809	5.8	-0.000879	0.1	0.246	99.9%	-0.0072	0.0055
T6	680820 890705	680820	890705	4.8	0.00153	0.05	0.0897	98.6%	-0.001	0.0041
T8	751015 760519	751015	760519	12	0.0137	0.14	0.14	100.%	-0.84	0.86
T9	720402 900828	720402	900828	6.4	-0.0106	0.24	0.21	94.9%	-0.019	-0.0022
T10	691202 720502	691202	720502	15	-0.0294	0.059	0.115	96.2%	-0.08	0.021

Table 5-3
(continued)
WQAMMN Time Trend Analysis

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time				95% confidence limits on slope	
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
T11	680716 900809	680716	900809	7.6	0.0016	0.085	0.201	99.7%	-0.0028	0.006
T12	691202 831026	691202	831026	5.8	-0.00351	0.11	0.152	99.%	-0.011	0.0041
T13	761021 810505	761021	810505	1.8	0.0211	0.054	0.0304	48.9%	0.00044	0.042
T15	810408 810408	810408	810408	2						
T17	810408 810408	810408	810408	1						
W1	701218 830104	701218	810714	2.1	0.0403	0.17	0.381	92.3%	-0.025	0.11
W2	731113 900621	731113	891205	2.9	-0.0346	0.43	0.279	74.2%	-0.052	-0.017
W3	810714 810714	810714	810714	2						
W4	680716 901213	680716	901213	6.9	0.00186	0.0046	0.0327	83.8%	0.0012	0.0025
W5	731113 830104	731113	800925	2.2	-0.15	0.93	0.449	69.5%	-0.29	-0.014
W6	680716 830104	680716	810714	5.3	0.0122	0.046	0.205	96.7%	-0.0037	0.028
W7	690731 901218	690731	901218	4.3	-0.0149	0.3	0.257	90.5%	-0.025	-0.0053
W8	700929 901218	700929	901218	3.1	-0.0171	0.34	0.238	83.3%	-0.027	-0.0073
W9	831128 890706	831128	890706	5.4	0.000259	0.023	0.011	99.8%	-0.0022	0.0027
W10	680716 900919	680716	900919	8	0.000676	0.058	0.174	99.9%	-0.0028	0.0041
W11	761020 830104	761020	830104	9.2	0.000865	0.047	0.0363	99.8%	-0.0045	0.0062
W12	810331 880707	810331	880707	1.1	-0.015	0.21	0.112	90.8%	-0.062	0.032
W13	810331 810331	810331	810331	2						
W14	841218 901213	841218	901213	3.7	0.0215	0.029	0.116	89.3%	-0.0075	0.051
W15	690730 901213	690730	901213	2.8	-0.0078	0.17	0.154	88.9%	-0.014	-0.002
W16	680716 900815	680716	900815	15	0.0112	0.0093	0.208	91.1%	0.0073	0.015
W18	690730 900815	690730	900815	5.8	-0.0466	0.97	0.575	83.7%	-0.066	-0.027
W19	680716 900213	680716	900213	5.1	0.0115	0.097	0.281	97.2%	-0.0014	0.024
W20	810331 810331	810331	810331	5						
W21	740204 901213	740204	901213	5	-0.0341	0.46	0.568	92.7%	-0.06	-0.0077

TABLE 5-4
Period of Record Statistics for Hydrographic Segments
WQXTSS

Segment	No. of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
C1	304	43	60	304	100.	3	840104	3	840104	590	660210	43	43
C2	357	40.7	39	356	99.7	6	770927	6	770927	530	660210	40.6	40.6
C3	46	53.6	47	46	100.	9	871105	9	871105	310	660210	53.6	53.6
C4	5	16.9	11	5	100.	7.2	871105	7.2	871105	35	850717	16.9	16.9
C5	338	38	29	337	99.7	0	760109	2.7	881218	250	670222	37.9	37.9
C6	34	61.1	150	34	100.	5.4	871014	5.4	871014	900	861203	61.1	61.1
D1	189	38.5	38	185	97.9	2	871006	2	871006	380	660216	37.7	37.8
D2	155	59.7	120	154	99.4	4	871006	4	871006	1400	730227	59.3	59.4
D3	140	30.1	27	140	100.	0.9	871102	0.9	871102	180	830811	30.1	30.1
D4	276	48.8	53	276	100.	0	761119	1	830208	590	730426	48.8	48.8
D5	51	30.7	24	51	100.	3.6	751114	3.6	751114	94	770325	30.7	30.7
E1	757	35	41	757	100.	0.9	900130	0.9	900130	450	500309	35	35
E2	745	36.6	40	745	100.	1.8	900130	1.8	900130	360	830428	36.6	36.6
E3	172	44.2	51	172	100.	2.7	900420	2.7	900420	360	831230	44.2	44.2
E4	238	42.7	46	238	100.	1.8	891004	1.8	891004	360	850403	42.7	42.7
E5	49	57.6	51	49	100.	4.5	891106	4.5	891106	210	820427	57.6	57.6
E6	19	56.1	33	19	100.	14	880317	14	880317	130	850311	56.1	56.1
E8	5	50.6	38	5	100.	22	850610	22	850610	130	850710	50.6	50.6
E9	10	20	14	10	100.	1.8	880511	1.8	880511	41	900207	20	20
E10	5	63.9	44	5	100.	22	841207	22	841207	140	860219	63.9	63.9
G1	82	36.4	28	82	100.	4.5	891010	4.5	891010	170	770214	36.4	36.4
G2	73	19.2	13	73	100.	1	810730	1	810730	88	900111	19.2	19.2
G3	271	32.2	25	271	100.	1	831215	1	831215	170	821020	32.2	32.2
G4	278	32.2	21	278	100.	0	751209	1.8	871201	140	830413	32.2	32.2
G5	175	21.8	22	175	100.	0	761118	0.9	881218	180	890104	21.8	21.8
G6	211	28.9	27	211	100.	0	760325	2.7	870507	200	831004	28.9	28.9
G7	619	30.8	78	619	100.	0.9	871102	0.9	871102	1800	500926	30.8	30.8
G8	189	28.8	30	189	100.	0	760724	0.9	891011	190	840511	28.8	28.8
G9	281	23.2	21	281	100.	0	760724	1.8	880711	190	830623	23.2	23.2
G10	224	24.7	23	224	100.	0.9	880317	0.9	880317	170	840103	24.7	24.7

TABLE 5-4 (continued)
WQXTSS Period of Record Statistics

Segment	No. of obs	Avg >DL	St dev >DL	No. > DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
G11	56	16.8	11	56	100.	0.9	900104	0.9	900104	38	850322	16.8	16.8
G12	94	29.2	49	94	100.	0.9	881218	0.9	881218	450	760719	29.2	29.2
G13	288	30.2	34	288	100.	0.9	881218	0.9	881218	330	660511	30.2	30.2
G14	198	42.7	86	198	100.	0	760719	1.8	871124	810	500605	42.7	42.7
G15	180	29.8	38	180	100.	2.7	880317	2.7	880317	450	861015	29.8	29.8
G16	65	23	16	65	100.	5	831215	5	831215	98	850509	23	23
G17	21	18.2	11	21	100.	3.6	870210	3.6	870210	50	851219	18.2	18.2
G18	366	26.2	19	362	98.9	1	800724	1	800724	140	680701	25.9	25.9
G19	69	26.1	25	69	100.	1.8	870617	1.8	870617	150	631211	26.1	26.1
G20	49	27.4	23	49	100.	1.8	871019	1.8	871019	110	840104	27.4	27.4
G21	4	31.7	21	4	100.	6.3	880517	6.3	880517	66	860321	31.7	31.7
G22	172	51.3	35	172	100.	1	820414	1	820414	210	840925	51.3	51.3
G23	227	44.6	45	227	100.	0	760719	3.6	870129	360	831027	44.6	44.6
G24	266	30.9	41	265	99.6	1.8	881102	1.8	881102	540	851216	30.8	30.8
G25	189	29.9	29	189	100.	1.8	900104	1.8	900104	170	830602	29.9	29.9
G26	374	31	36	374	100.	1.8	880516	1.8	880516	350	851030	31	31
G27	375	35.9	100	375	100.	0.9	900130	0.9	900130	1800	500605	35.9	35.9
G28	214	31.8	45	214	100.	2.7	870909	2.7	870909	360	830620	31.8	31.8
G29	365	37.8	47	365	100.	0	760724	1.8	880321	450	761020	37.8	37.8
G30	352	51.8	78	352	100.	1.8	880516	1.8	880516	720	500628	51.8	51.8
G31	342	39.9	74	342	100.	0.9	900130	0.9	900130	790	500309	39.9	39.9
G32	250	31.8	41	250	100.	1.8	880321	1.8	880321	360	831230	31.8	31.8
G33	20	25	23	20	100.	4.5	750425	4.5	750425	110	900222	25	25
G34	168	47	48	168	100.	0	760724	4.5	760719	340	840420	47	47
G35	481	43.8	55	479	99.6	0	751216	1	770921	620	630507	43.6	43.6
G36	9	14.4	8.5	9	100.	5	750523	5	750523	32	750611	14.4	14.4
G37	36	21.8	17	36	100.	5	820921	5	820921	76	840104	21.8	21.8
G38	2	9.45	1.3	2	100.	8.1	890426	8.1	890426	11	890427	9.45	9.45
H1	525	50.2	60	524	99.8	3	800916	3	800916	710	750618	50.1	50.1
H2	62	23.6	23	62	100.	1	810106	1	810106	180	740515	23.6	23.6
H3	80	36.7	37	80	100.	3	770125	3	770125	280	860206	36.7	36.7

TABLE 5-4 (continued)
WQXTSS Period of Record Statistics

Segment	No. of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
H4	61	37	22	60	98.4	5.4	890414	5.4	890414	120	790416	36.4	36.4
H5	81	27.9	17	80	98.8	2	810106	2	810106	78	800124	27.5	27.6
H6	12	36.2	51	12	100.	4.5	871014	4.5	871014	200	850430	36.2	36.2
H7	106	32.5	30	106	100.	0	760719	1.8	891010	260	820804	32.5	32.5
H8	72	28	20	71	98.6	2	780227	2	780227	90	861229	27.6	27.6
H9	6	25.3	12	6	100.	5.4	870504	5.4	870504	44	840925	25.3	25.3
H10	78	26.2	17	76	97.4	4	830125	4	830125	81	850503	25.6	25.6
H11	366	47.9	70	365	99.7	3	761122	3	761122	530	741216	47.8	47.8
H12	40	32.1	18	40	100.	10	630819	10	630819	79	631104	32.1	32.1
H13	403	41.4	120	401	99.5	1	800729	1	800729	2000	741216	41.2	41.2
H14	33	58.4	72	32	97.	6	740423	6	740423	420	731115	56.7	57
H15	371	32	35	365	98.4	1	880519	1	880519	330	780213	31.4	31.5
H16	9	49	55	8	88.9	12	840711	12	840711	190	820804	43.6	44.7
H17	767	30.9	61	746	97.3	1	801112	1	801112	1100	751125	30	30.1
H18	36	72.2	130	34	94.4	1	770201	1	770201	750	771205	68.2	68.5
H19	399	46.6	76	397	99.5	0	810210	1	801015	1000	770920	46.3	46.3
H20	506	56.4	57	504	99.6	2	801015	2	801015	390	771214	56.2	56.2
M1	3	4.8	0.85	3	100.	3.6	881222	3.6	881222	5.4	880128	4.8	4.8
M3	8	8.99	8	8	100.	1.4	750611	1.4	750611	27	750507	8.99	8.99
M4	1	18	0	1	100.	18	880927	18	880927	18	880927	18	18
M6	2	30.2	16	2	100.	14	830510	14	830510	46	830509	30.2	30.2
S1	3	30	14	3	100.	14	840711	14	840711	49	850227	30	30
T1	308	33.6	50	308	100.	1.8	881102	1.8	881102	540	851216	33.6	33.6
T2	298	48.9	58	297	99.7	1	811209	1	811209	590	650223	48.7	48.7
T3	129	35.4	32	128	99.2	0	760224	2	810730	170	741125	35.2	35.2
T4	158	25.9	23	158	100.	2.7	890316	2.7	890316	150	830413	25.9	25.9
T5	256	38.9	49	252	98.4	1.8	871202	1.8	871202	360	740221	38.3	38.3
T6	203	45.1	45	203	100.	0	751216	2.7	871202	360	650223	45.1	45.1
T8	37	70.1	41	37	100.	0	760324	18	760129	160	751112	70.1	70.1
T8	37	70.1	41	37	100.	0	760324	18	760129	160	751112	70.1	70.1
T9	210	60.9	60	210	100.	0	690528	3.3	761111	410	730521	60.9	60.9

TABLE 5-4 (continued)
WQXTSS Period of Record Statistics

Segment	No. of obs	Avg >DL	St dev >DL	No.> DLs	% > DLs	Min	date	Min >0	date	Max	date	Avg w/ BDL=0	Avg w/ BDL=DL
T10	382	41	46	382	100.	1.8	871202	1.8	871202	360	831107	41	41
T11	383	39.6	56	381	99.5	1	770921	1	770921	620	630507	39.4	39.4
T12	106	47.5	37	106	100.	2.7	891120	2.7	891120	210	800519	47.5	47.5
T13	19	50.1	47	19	100.	11	761118	11	761118	220	761208	50.1	50.1
T14	58	39.6	47	58	100.	1.8	881207	1.8	881207	260	790523	39.6	39.6
T15	215	67.8	70	215	100.	1.8	880511	1.8	880511	360	840522	67.8	67.8
T16	38	61.7	83	38	100.	4.5	881114	4.5	881114	420	861212	61.7	61.7
T17	3	16.8	14	3	100.	6.3	881114	6.3	881114	37	860324	16.8	16.8
T19	1	7.2	0	1	100.	7.2	891220	7.2	891220	7.2	891220	7.2	7.2
W1	269	32.4	39	269	100.	0.9	881219	0.9	881219	360	800623	32.4	32.4
W2	329	35.2	35	327	99.4	0	890105	1	810113	320	840508	35	35
W3	49	40.7	43	49	100.	1.8	870128	1.8	870128	250	801028	40.7	40.7
W4	182	27.4	22	182	100.	2.7	870318	2.7	870318	160	850319	27.4	27.4
W5	137	30.4	43	137	100.	1	770922	1	770922	320	840411	30.4	30.4
W6	137	37.4	37	137	100.	0.9	871008	0.9	871008	260	660221	37.4	37.4
W7	386	42.5	37	386	100.	0.9	871008	0.9	871008	310	700619	42.5	42.5
W8	150	47.7	69	150	100.	3.6	870722	3.6	870722	760	721128	47.7	47.7
W9	241	28.1	21	241	100.	1.8	881219	1.8	881219	140	840509	28.1	28.1
W10	328	32.7	44	328	100.	0.9	881219	0.9	881219	650	761117	32.7	32.7
W11	352	35.6	100	352	100.	1.8	880516	1.8	880516	1800	761020	35.6	35.6
W12	127	34.8	30	127	100.	3.6	870318	3.6	870318	190	790307	34.8	34.8
W13	89	35.6	32	89	100.	2.7	870511	2.7	870511	180	860407	35.6	35.6
W14	152	35.4	35	152	100.	1.8	880516	1.8	880516	330	890613	35.4	35.4
W15	199	33.9	29	199	100.	1.8	871103	1.8	871103	280	781205	33.9	33.9
W16	478	33.4	30	476	99.6	1	770906	1	770906	240	840329	33.2	33.2
W17	175	35.9	44	175	100.	0.9	871104	0.9	871104	360	840321	35.9	35.9
W18	154	27.6	32	152	98.7	0.81	750318	0.81	750318	340	780501	27.2	27.2
W19	96	30.3	22	94	97.9	1.8	881220	1.8	881220	110	890410	29.7	29.7
W20	38	37.7	40	38	100.	3.6	890201	3.6	890201	180	860220	37.7	37.7
W21	143	21.9	38	141	98.6	1	771207	1	771207	420	740304	21.6	21.6

Table 5-5
Time Trend Analysis for Hydrographic Segments:
WQXTSS

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
C1	630402 900910	630402	900910	11	-0.0629	43	60	100.%	-0.91	0.78
C2	630402 901210	630402	901210	13	-0.823	50	38.7	96.5%	-1.3	-0.37
C3	630418 900214	630418	900214	1.7	-1.3	59	46.1	96.6%	-3.4	0.78
C4	850717 890424	850717	890424	1.3	-5.99	31	8.08	53.4%	-18	5.8
C5	630701 901210	630701	901210	12	-0.866	50	28.3	95.1%	-1.3	-0.45
C6	840919 900627	840919	900627	5.9	-14.5	110	146	96.8%	-43	14
D1	650303 900710	650303	900710	7.3	-1.52	52	36.2	90.3%	-2.2	-0.84
D2	630605 900710	630605	900710	5.7	-1.88	85	117	98.6%	-4.4	0.69
D3	630514 900626	630514	900626	5.2	0.127	28	27.5	99.9%	-0.65	0.9
D4	500831 900815	500831	900815	6.9	-0.984	76	52.2	98.3%	-1.9	-0.087
D5	500831 900428	500831	900428	1.3	-0.522	45	23.2	95.1%	-1.2	0.13
E1	500309 900606	500309	900606	19	-1.64	92	39.8	94.7%	-2.1	-1.1
E2	630730 901008	630730	901008	27	-1.09	60	39.6	97.1%	-1.6	-0.63
E3	630723 900611	630723	900611	6.4	-0.517	54	50.8	99.3%	-1.5	0.44
E4	630723 900612	630723	900612	8.9	-1.14	62	44.6	95.5%	-1.8	-0.46
E5	690422 900612	690422	900612	2.3	-2.46	92	48.5	91.4%	-4.8	-0.15
E6	790820 900423	790820	900423	1.8	-5.42	89	27.7	72.5%	-9.9	-0.92
E8	850610 900611	850610	900611	1	-7.26	69	34.8	82.3%	-36	21
E9	850409 900523	850409	900523	2	-3.46	29	12.2	77.6%	-8.7	1.8
E10	841207 860423	841207	860423	3.6	42.8	21	38.2	75.1%	-94	180
G1	630508 900522	630508	900522	3	-0.587	46	27	96.%	-1.2	0.052
G2	731105 900719	731105	900719	4.4	0.217	17	12.6	99.3%	-0.41	0.84
G3	630604 900618	630604	900618	10	-1.35	57	23	86.6%	-1.8	-0.94
G4	630402 900618	630402	900618	10	-1.02	48	19.2	81.4%	-1.3	-0.77
G5	630521 900618	630521	900618	6.5	-1.3	51	21.6	92.7%	-2	-0.6
G6	630618 900618	630618	900618	7.8	-1.11	51	25.8	90.%	-1.6	-0.65

Table 5-5
 (continued)
 WQXTSS

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
G7	500227 901113	500227	901113	15	-2.34	110	74.6	90.8%	-2.9	-1.8
G8	500317 900402	500317	900402	4.7	-0.877	54	29	91.4%	-1.3	-0.46
G9	630606 900620	630606	900620	10	-0.905	42	20.6	91.6%	-1.3	-0.55
G10	630507 900402	630507	900402	8.3	-1.04	46	20.9	86.6%	-1.4	-0.69
G11	841127 900402	841127	900402	10	-5.3	29	7.15	43.6%	-6.6	-4
G12	760719 900618	760719	900618	6.8	-3.96	66	46.3	90.2%	-6.4	-1.5
G13	500810 900618	500810	900618	7.2	-1.45	72	30.3	79.6%	-1.8	-1.1
G14	500111 900507	500111	900507	4.9	-2.77	120	79.3	84.5%	-3.7	-1.9
G15	630507 900618	630507	900618	6.6	-0.182	33	37.5	99.8%	-0.81	0.45
G16	820804 900618	820804	900618	8.3	-1.61	29	16	96.5%	-3.7	0.49
G17	841126 900223	841126	900223	4	-3.86	25	8.94	71.5%	-6.8	-0.93
G18	630425 901210	630425	901210	13	-0.857	41	17.8	87.7%	-1.1	-0.62
G19	630514 900312	630514	900312	2.6	-1.13	43	22	78.4%	-1.7	-0.61
G20	630606 900606	630606	900606	1.8	-0.627	38	22.7	94.2%	-1.4	0.1
G21	860321 880517	860321	880517	1.9	-20.2	46	13	36.7%	-67	26
G22	630521 900711	630521	900711	6.3	-0.821	65	34.7	97.2%	-1.6	-0.09
G23	630903 900226	630903	900226	8.6	-1.13	63	43.6	94.9%	-1.8	-0.48
G24	630812 900618	630812	900618	9.9	-1.28	59	40.8	98.2%	-2.4	-0.11
G25	761021 900223	761021	900223	14	-2.52	52	27.2	90.4%	-3.6	-1.4
G26	520205 900606	520205	900606	9.8	-2.32	110	35.1	92.8%	-3.2	-1.5
G27	500306 900606	500306	900606	9.3	-5.15	220	95.2	83.3%	-6.3	-4
G28	760719 900606	760719	900606	15	-6.35	98	42.2	88.3%	-8.7	-4
G29	630425 900212	630425	900212	14	-0.53	47	47.2	99.%	-1.1	0.032
G30	500306 900606	500306	900606	8.7	-1.99	120	75.6	93.1%	-2.8	-1.2
G31	500309 900606	500309	900606	8.5	-5.01	220	65.8	79.9%	-6.1	-3.9
G32	720927 901008	720927	901008	14	-2.9	70	39.9	92.5%	-4.2	-1.6

Table 5-5
 (continued)
 WQXTSS

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
G33	750425 900306	750425	900306	1.3	1.7	17	21.1	81.1%	-0.045	3.5
G34	630514 900417	630514	900417	6.2	0.686	37	47.4	98.3%	-0.12	1.5
G35	750418 900516	750418	900516	16	0.669	40	46.1	99.8%	-1.3	2.6
G36	750417 750611	750417	750611	60	9.32	14	8.47	99.7%	-140	160
G37	820427 901113	820427	901113	4.2	0.127	21	16.8	100.%	-2.1	2.4
G38	890426 890427	890426	890427	730	985	8.1	0	0.%	0	0
H1	630312 900711	630312	900711	19	-0.398	56	59.5	99.7%	-1.1	0.27
H2	730214 900711	730214	900711	3.6	-0.785	30	22.8	97.4%	-2	0.43
H3	650125 890415	650125	890415	3.3	0.326	33	36.6	99.4%	-0.63	1.3
H4	730911 900828	730911	900828	3.5	-0.504	41	21.4	98.5%	-1.6	0.55
H5	730911 900711	730911	900711	4.8	-0.583	33	16.9	97.%	-1.3	0.16
H6	850430 880928	850430	880928	3.5	-38.5	110	33	42.1%	-62	-15
H7	630522 900110	630522	900110	4	0.445	29	29.5	98.5%	-0.25	1.1
H8	730911 900711	730911	900711	4.2	-0.981	37	19.5	94.3%	-1.9	-0.033
H9	840925 900319	840925	900319	1.1	-3.49	36	10.1	70.2%	-11	3.9
H10	730911 900711	730911	900711	4.5	-0.528	31	16.3	97.6%	-1.3	0.24
H11	630702 900813	630702	900813	13	-0.985	63	69.8	99.%	-2	0.033
H12	630624 850227	630624	850227	1.8	0.449	30	17.3	97.1%	-0.38	1.3
H13	630702 900711	630702	900711	15	-1.15	58	117	99.5%	-2.8	0.52
H14	730104 850227	730104	850227	2.6	-2.15	63	71.2	98.8%	-9.4	5.1
H15	671001 900813	671001	900813	16	-2.4	61	33.1	87.6%	-3.1	-1.7
H16	820804 850227	820804	850227	3.1	-56.4	160	31.3	31.9%	-95	-18
H17	720210 900813	720210	900813	40	-2.75	55	59.1	94.5%	-3.6	-1.9
H18	760609 850227	760609	850227	3.9	-8.43	97	126	97.7%	-28	11
H19	690527 900711	690527	900711	19	-3.49	83	73.3	93.5%	-4.8	-2.2
H20	720210 900813	720210	900813	27	-2.98	84	54.5	91.9%	-3.9	-2.1

Table 5-5
(continued)
WQXTSS

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
M1	880128 900112	880128	900112	1.5	0.0472	4.8	0.848	99.8%	-13	14
M3	750417 750611	750417	750611	53	-95.8	18	5.86	53.6%	-200	7.1
M4	880927 880927	880927	880927	1						
M6	830509 830510	830509	830510	730	-11500	46	0	0.%	0	0
S1	840711 900425	840711	900425	0.52	-0.271	31	14.4	99.8%	-71	70
T1	700226 900627	700226	900627	15	-4.04	99	48.2	91.3%	-5.5	-2.6
T2	630717 900515	630717	900515	11	-1.68	75	56.5	94.4%	-2.5	-0.89
T3	720802 900809	720802	900809	7.1	-2.68	61	29	82.2%	-3.7	-1.7
T4	630903 900618	630903	900618	5.9	-0.822	45	23.2	98.%	-1.7	0.09
T5	630729 900809	630729	900809	9.3	-1.25	61	47.9	96.2%	-2	-0.47
T6	630729 900309	630729	900309	7.6	-2.05	79	42.8	88.8%	-2.9	-1.2
T7	851216 880523	851216	880523	1.2	-27	73	3.24	1.3%	-66	12
T8	751029 760506	751029	760506	71	-64.4	86	39.2	92.2%	-140	9.7
T9	690528 900828	690528	900828	9.9	-1	69	59.6	99.3%	-2.7	0.67
T10	630812 900606	630812	900606	14	-1.36	66	44.6	93.7%	-1.9	-0.82
T11	630507 900809	630507	900809	14	-1.65	69	54.3	93.9%	-2.3	-0.99
T12	751125 891120	751125	891120	7.6	-2.62	58	35	90.5%	-4.2	-1.1
T13	701118 881207	701118	881207	1.1	0.544	47	46.7	99.7%	-4.9	5.9
T14	751120 900524	751120	900524	4	-8.02	120	37.6	63.4%	-11	-5.2
T15	740418 900523	740418	900523	13	-3.53	100	69	96.4%	-6	-1.1
T16	771003 890511	771003	890511	3.3	-5.31	92	80.7	94.%	-12	1.6
T17	860324 881115	860324	881115	1.1	-11.4	37	0.38	0.1%	-15	-7.5
T19	891220 891220	891220	891220	1						
W1	701218 900620	701218	900620	14	-3	73	36.3	86.5%	-3.9	-2.1
W2	501012 900621	501012	900621	8.2	-2.25	110	32.9	89.5%	-3	-1.5
W3	780920 890501	780920	890501	4.6	-9.74	100	32.9	57.5%	-13	-6.5

Table 5-5
 (continued)
 WQXTSS

Segment	Period of record dates	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope		
		Start date	End date		slope (per yr)	intercept (@ start)	SEE	residual variance	lower	upper
W4	760105 901213	760105	901213	12	-0.908	35	21.9	96.9%	-1.7	-0.16
W5	731113 900529	731113	900529	8.3	-1.95	51	41.9	95.4%	-3.5	-0.44
W6	500414 900404	500414	900404	3.4	-0.11	40	36.8	99.9%	-0.7	0.48
W7	630724 901218	630724	901218	14	-1.58	70	34.9	91.2%	-2.1	-1.1
W8	631016 901218	631016	901218	5.5	-1.19	64	68	98.4%	-2.7	0.31
W9	630724 900618	630724	900618	9	-0.631	40	20.2	95.8%	-1	-0.25
W10	650121 900919	650121	900919	13	-1.52	59	43.4	95.5%	-2.3	-0.75
W11	501011 900618	501011	900618	8.9	-1.95	99	100	98.%	-3.4	-0.49
W12	500320 900626	500320	900626	3.2	0.324	27	29.8	98.3%	-0.12	0.77
W13	630807 900618	630807	900618	3.3	-1.1	55	30.8	91.%	-1.8	-0.36
W14	500320 901213	500320	901213	3.7	-0.308	45	35.3	99.%	-0.8	0.18
W15	500809 901213	500809	901213	4.9	-0.65	51	28.4	95.9%	-1.1	-0.21
W16	500809 900815	500809	900815	12	-0.757	55	29.4	96.2%	-1.1	-0.41
W17	500914 900511	500914	900511	4.4	-0.769	60	43.2	97.9%	-1.6	0.026
W18	630805 900815	630805	900815	5.6	-0.599	36	31.9	98.2%	-1.3	0.11
W19	650119 900320	650119	900320	3.7	-0.706	39	21.2	93.2%	-1.2	-0.17
W20	771212 900626	771212	900626	3	-3.97	68	37.5	88.3%	-7.6	-0.36
W21	500809 901213	500809	901213	3.5	-0.069	24	37.6	100.%	-0.72	0.58

5.1 Spatial Variation in Water Quality

The general spatial variation of key water quality parameters is depicted in Figs. 5-1 through 5-23. These are based upon the average values for each segment computed with BDL values taken as 0. These figures should be employed together with the corresponding sampling intensity figure of Chapter 3, because the number of data points available in a given segment indicates the validity of that average. Only selected metals and organics are shown in these figures, to provide some indications of spatial variation supported by the data base for the respective parameters.

Temperature, salinity, and dissolved oxygen warrant special treatment because of the nature of the external controls (to anticipate somewhat the discussion of Chapter 7). These are measured either at a single point in the vertical (usually near the surface) or as a vertical profile, but no discrimination by depth is made here in the construction of the statistics tables. To emphasize the horizontal variation in these parameters, as well as to eliminate any spurious weighting of stations where profile data were taken, these parameters were screened for near-surface values only. For salinity this was taken to be the upper 1.5 meters (5 feet) of the water column, and for temperature and DO (much more sensitive to surface processes than salinity) this was 0.5 meters (1.5 feet). Further, temperature statistics were computed for winter and summer conditions, defined as December-February and July-August, respectively. For salinity, both a year-round and a late-summer period were analyzed, the latter, taken as July-September, corresponding to the usual low-flow season. The results of all of these statistics are given in Tables 5-5 through 5-11 (in a slightly more compressed format than that of Table 5-2) for the hydrographic segments. It is these results that are shown in Figs. 5-1 through 5-7.

Coliforms present a special problem. Traditionally, coliform data have been subjected to log-transforms before analysis. The statistics computed here, presented in the Appendix as well as in Figs. 5-16 and 5-18, are based upon nontransformed ("raw") concentrations. The log-transform reduces the large range of variation and the extreme skewness of the raw concentrations, and therefore generally reduces the variance and improves any correlation analyses. It is inappropriate to debate here whether the processes underlying coliform behavior warrant a log-normal assumption; rather, we make both types of analysis available to the user. Tables 5-12 and 5-13 present the period of record statistics for geometric-mean coliform data (i.e., the exponentiated value of the arithmetic mean of the logarithm of concentration), and Figs. 5-17 and 5-19 display the corresponding spatial variation.

The extent of vertical stratification in a parameter is frequently of concern in water-quality analysis. The intensity of vertical mixing in the Texas bays, and the resulting vertical homogeneity of the water column has been frequently remarked, e.g. Ward (1980). In the case of Galveston Bay, Espey et al. (1971a,b) specifically addressed the vertical structure in the Galveston Bay Project data

base, and found near vertical homogeneity in the open bay, and slight-to-moderate salinity stratification in the deep channels, especially in association with freshets. With the data base assembled here, the extent of vertical stratification was analyzed for each variate for which coincident measurements at two depths were available. This was predominantly temperature, salinity and dissolved oxygen, and to a lesser extent nitrogen series, TOC, suspended solids and chlorophyll-a. Vertical stratification VS was computed as the vertical gradient in concentration between the two most widely separated measurements in the vertical

$$VS = \Delta c / \Delta z \quad (5-1)$$

where Δc is the upper-to-lower difference in concentration, and Δz is the difference in elevation of the two measurements with z positive upwards. It must be emphasized that *stratification* is measured in its fluid dynamics sense, and does not imply any "layering" of the water (which entails quantum changes in parameter values at an interface, i.e. singularities in stratification). Such "layering" and associated concepts, such as the notorious "saline wedge," are rare and evanescent phenomena in Galveston Bay. We note, from (5-1), that the units of stratification are parameter units per unit depth, e.g. ppm per meter, and VS is positive if concentration increases upward. Therefore, the normal density stratification implies a positive stratification in temperature and a negative stratification in salinity.

The vertical stratification in water-quality parameters is tabulated in Tables 5-14 through 5-24. This data is presented in two ways: the arithmetic average stratification in each segment, with the associated standard deviation, and the percentage of the data exhibiting positive stratification. The predominance of stratification is manifested by a large value of gradient compared to the normal magnitude of concentration, and/or a predominance of sign. The general negative stratification in salinity and suspended solids, and the general positive stratification in temperature and dissolved oxygen are consistent with the physical processes controlling each of these (to anticipate, again, the discussions of Chapter 7).

One indication of association among water-quality variables, which can be diagnostic for similar loads and/or physical processes, is the value of the linear correlation coefficient. These are presented as a correlation array for the suite of water-quality variates in Tables 5-25 through 5-28. In order to emphasize spatial associations among the variates, these correlations were computed using the average segment concentrations, rather than correlations among raw measurements (which would weigh more greatly those areas of the bay with denser data bases). Since the concentration of a parameter in the bay is affected both by kinetic and spatially varying controls, the correlation between spatial-mean values will be reduced for kinetically associated variates (e.g., dissolved oxygen and temperature) lacking spatial coherence, but enhanced for variates with geographic associations but lacking kinetic associations. Generally, the net effect is an erosion in correlation, so that we do not expect particularly high values. In Tables 5-24 *et seq.*, those entries exceeding 40% are indicated in boldface. (We note that this correlation calculation does not weigh the individual

data points by the area or volume of the segment, so that small segments are counted as heavily as their larger counterparts.)

TABLE 5-6
 WQTEMP Period of Record Statistics for Hydrographic Segments
 Average winter (December-February) temperatures within upper 0.5 m

Segment	No. of obs	Avg	St dev	min	date	max	date
C1	116	14.2	3.3	4	831230	21	631202
C2	215	13.9	3.4	4.4	640113	22	720229
C3	31	14.1	3.9	5.8	590105	21	631202
C4	51	12.7	3.8	2.9	630128	19	590217
C5	205	13.6	3.8	2.9	630128	23	721207
C6	27	13.2	3.5	5	670109	19	661205
D1	69	13.2	3.4	6	660224	24	721207
D2	62	13.2	4	5	640114	23	721207
D3	88	12.7	3.4	1	770106	20	750131
D4	78	13.4	4.2	1	780120	23	721207
D5	26	13.8	2.7	8.9	710210	20	760212
E1	424	12.4	3.9	3.9	910122	23	841221
E2	382	12	3.7	3.9	910122	23	841221
E3	105	12.1	4.3	1	831230	20	661209
E4	194	13	4.1	3	631223	22	661209
E5	47	12.9	4.2	2	631223	23	860219
E8	25	12.8	4.1	4	631223	18	640227
E9	15	12.5	3.2	7	630122	19	640227
E10	3	13.7	5.2	10	841207	21	860219
G1	98	13	3	6.5	850205	20	770214
G2	3	13.7	2.9	11	860110	18	900111
G3	108	12.1	3.7	4	790103	23	840223
G4	192	12.9	3.6	3.2	630213	22	841218
G5	145	12.6	3.3	3.1	630128	19	831205
G6	119	14.2	4.3	5	660126	24	860227
G7	448	12.9	3.3		0120	21	781219
G8	77	12.3	~ ~		0120	21	520117
G9	104	12.4			0209	21	841228
G10	96	12.9	3.5	6.3	850206	20	841219
G11	16	12.2	3.8	7	850205	19	860203
G12	16	10.7	3.4	5.7	850206	18	860203
G13	243	12.8	3.4	1.1	660224	24	731212
G14	105	12.7	3.3	2.2	820118	19	831205
G15	118	13.1	3.4	4.8	630125	29	631218
G16	27	13	2.9	6	850206	17	900212
G17	37	12.7	3.2	6.1	880114	19	831205
G18	172	12.5	3.1	4.2	630125	24	731212
G19	194	12.4	3	3.9	910122	19	831205
G20	96	12.5	2.9	6.1	660126	20	841228
G21	16	11	2.1	7.5	630125	14	630205
G22	67	12.9	3	6.7	660127	19	820218
G23	146	12.6	3.2	5.7	630213	21	661205

TABLE 5-6
(continued)

Segment	No.of obs	Avg	St dev	min	date	max	date
G24	139	12.1	3.4	2.7	630128	22	841219
G25	73	11.3	3.1	4.4	630125	18	651215
G26	84	11.6	3	3	630128	18	841214
G27	95	12.5	3.2	6	780208	19	841214
G28	47	12.9	3.2	4	630128	20	841228
G29	249	12	3.3	0.2	630124	20	771201
G30	252	11.9	3.5	2.5	630128	21	880201
G31	101	12.1	4.4	0.4	630114	23	841221
G32	95	12.5	4.2	1	831230	22	841221
G33	3	13.6	0.86	12	730113	14	900222
G34	111	12.3	2.7	3.9	910122	17	650106
G35	42	13	2.7	6.9	850207	20	661209
G36	58	12.3	2.4	8	670109	18	661208
H1	173	13.6	2.8	6.7	890210	19	651215
H3	16	14.1	3.4	8	850208	21	860206
H4	17	12.9	3.2	8.7	880112	18	740214
H5	28	14.1	2.9	9	790122	21	740214
H7	162	12.7	2.5	6.7	571212	18	660110
H8	68	13.2	2.9	7.2	580109	18	881207
H10	144	12.1	2.9	6.1	571212	18	740214
H11	135	13.4	2.6	8.3	580109	21	841220
H12	59	13.3	3.5	8.3	580109	29	590217
H13	108	14	2.7	8	770117	20	760219
H14	68	14.1	2.6	8.9	590205	21	841220
H15	71	15.1	2.1	11	770117	20	760219
H16	13	15.9	1.4	12	700113	18	691202
H17	173	15.8	2.1	11	770117	21	760219
H18	14	16.5	3.9	11	770104	22	771205
H19	88	15.8	2.4	9.7	800212	21	731205
H20	147	15.1	3.3	4	800212	22	760220
M1	3	14.9	3.7	10	900112	19	881222
M3	38	11.8	3.2	8.4	630205	18	760217
S1	22	12.9	2.5	8.3	580213	18	691202
T1	156	12.1	3.6	0.9	851216	22	841219
T2	145	12.6	3.5	6	700113	21	711227
T3	57	13.6	4.4	3	760106	25	841218
T4	106	12.2	3.1	6.7	660201	21	841219
T5	104	11.8	3.2	2.4	630128	19	861209
T6	131	11.9	3.4	2.5	760106	19	620221
T7	38	12.4	3.5	5	680215	20	671202
T8	122	12	4	0	760108	23	760212
T9	109	12.4	4	1	760108	25	721204

TABLE 5-6
(continued)

Segment	No. of obs	Avg	St dev	min	date	max	date
T10	271	12.3	3.5	2.3	630128	22	841219
T11	224	12.2	3.4	2.1	630128	21	841221
T12	42	11.4	2.4	6	700113	17	720223
T13	9	13.4	3.3	11	761229	20	650211
T14	10	17.1	3.9	6.8	861229	23	841219
T15	108	12.7	3.8	3.6	891218	21	650211
T16	6	11.6	3.3	7	780110	15	861212
T17	7	12	3.3	6.7	770118	16	740109
T18	53	12.2	3.3	6	630131	20	640219
W1	77	15	4.9	3	780113	24	890227
W2	79	14.7	3.4	6.1	850115	24	890227
W3	16	14	5.1	6	790206	24	890227
W4	67	13.5	4.2	6.5	780209	25	890105
W5	30	14	4.3	2.6	891227	21	881222
W6	94	13.6	3.2	5	780119	23	711230
W7	83	13.7	3.4	4	891227	21	820224
W8	47	14.1	3.4	6	891220	21	720225
W9	118	13.4	3.8	2.1	891227	23	890105
W10	191	12.7	3.6	2	831228	21	841218
W11	168	13.1	3.9	2.3	891227	23	860121
W12	133	14.5	3.9	1	761221	21	820224
W13	35	13.7	3.3	6	770121	21	820224
W14	29	13.9	4.4	6	780208	22	811203
W15	111	13.1	3.1	5.2	700114	21	771205
W16	146	12.2	3.4	3	780222	22	841218
W17	37	13	3.4	3	770118	19	851209
W18	22	13.4	3	7.8	840112	20	881207
W19	24	13.2	2.7	7.2	660203	18	711221
W20	5	17.4	2.9	13	771212	21	860220
W21	164	13	2.9	6	620115	22	620227

TABLE 5-7
 WQTEMP Period of Record Statistics for Hydrographic Segments
 Average summer (July-August) temperatures in upper 0.5 m

Segment	No. of obs	Avg	St dev	min	date	max	date
C1	82	29.8	1.8	26	640826	36	630826
C2	176	30.7	1.9	25	610712	36	640714
C3	24	30.8	2	26	630702	34	580721
C4	37	30.7	1.7	27	610712	34	630722
C5	144	30.7	2.1	24	660825	39	660728
C6	36	29.5	1.8	24	660825	32	640716
D1	58	29.2	1.5	23	660825	32	780711
D2	47	30.1	1.5	27	720705	33	630708
D3	68	29.8	1.3	27	720815	33	630709
D4	41	29.8	1.5	26	720705	33	790806
D5	12	29.4	1.4	27	680828	32	880803
E1	285	29.6	1.2	26	650805	35	650701
E2	238	29.8	1	27	640720	33	890828
E3	168	30.3	1.9	16	660825	36	630826
E4	160	30	1.3	27	640720	35	870803
E5	30	30.6	1.8	26	890727	35	850805
E8	21	30.8	1.7	28	640720	35	630826
E9	12	30.7	0.87	29	640720	33	890828
G1	58	30.5	1.2	28	840702	33	880803
G3	68	29.9	1.4	28	840702	34	780718
G4	110	29.9	1.4	25	660825	33	630805
G5	101	29.9	1.4	24	870701	35	630708
G6	83	30.6	2.3	21	640714	38	690715
G7	305	29.6	1.4	23	870701	33	660809
G8	58	29.3	1.5	24	660825	32	640709
G9	77	29.7	1.6	20	770824	32	740823
G10	74	30.1	1.1	28	840702	33	630805
G11	5	30.3	1.5	28	860707	32	860819
G12	13	29.2	2.5	21	870701	32	760724
G13	120	30	1.4	27	890809	35	630708
G14	63	29.5	1.5	26	870701	33	690819
G15	90	30.1	1.1	27	890810	33	630722
G16	33	29.9	1	28	700707	33	870805
G17	21	29.4	1.5	24	870701	31	850813
G18	98	30	1.4	27	740806	33	630708
G19	116	29.8	1.3	25	870701	33	630722
G20	68	30	1.2	26	700707	32	640708
G21	12	31	1.2	28	640714	33	640811
G22	46	30	1.1	27	800729	32	640706
G23	113	30.4	1.4	25	660825	35	840823
G24	110	29.8	1.3	21	630806	33	700817
G25	45	30.3	1.6	29	870702	36	630708

TABLE 5-7
(continued)

Segment	No. of obs	Avg	St dev	min	date	max	date
G26	57	29.7	1.5	25	870701	34	640812
G27	52	29.4	1	28	870701	32	870805
G28	39	30.5	1.1	29	870721	33	630709
G29	198	29.8	1.1	27	640803	33	890828
G30	126	29.4	2.1	10	660816	33	630709
G31	78	30.1	0.97	28	500810	33	630709
G32	54	30.1	1.1	28	700707	32	630709
G33	6	29.2	1.4	28	760713	31	640813
G34	86	29.9	1.3	26	760722	35	880816
G35	30	29.7	1.2	28	640714	33	630705
G36	40	29.5	1.4	26	700707	33	630705
H1	146	30	1.2	27	690827	37	880823
H3	31	30.3	1.1	28	840711	34	650719
H4	24	30.4	1.5	28	840711	34	810721
H5	38	31	1.2	29	890712	33	760818
H7	198	30	1.2	28	590729	34	820803
H8	68	29.5	1.1	27	580826	32	580806
H10	108	29.6	1.4	27	580826	34	580806
H11	124	30.3	1	28	590729	33	650719
H12	62	30.5	0.99	27	590729	34	820803
H13	106	30.4	1.1	27	590729	33	580806
H14	65	30.4	1.7	25	700707	33	690715
H15	90	30.1	1.1	26	730711	32	750812
H16	34	30.5	1.5	26	840710	34	680820
H17	189	30.6	2	26	840710	39	820803
H18	35	30.4	1.4	26	790725	36	800715
H19	84	29.7	1.2	27	750715	33	700826
H20	173	29.2	1.7	22	730814	33	820803
M3	20	30.9	1.4	28	640714	34	750825
S1	27	30.7	0.82	29	580708	32	680820
T1	103	30	1.4	27	610831	33	700817
T2	107	30.2	1.6	22	630807	33	690819
T3	44	29.5	2.6	22	750723	34	870805
T4	83	30	1.2	27	720802	32	630710
T5	89	29.9	1.4	27	890809	33	630710
T6	104	29.7	2.3	22	750723	36	650715
T7	24	29.3	2.4	26	670722	33	660715
T8	84	28.9	2.8	22	750805	33	660715
T9	79	29.8	2.1	24	750723	34	760812
T10	163	29.7	1.3	26	720802	34	640812
T11	195	29.6	1.4	26	750828	34	640812
T12	15	29.9	0.7	29	700707	31	770706
T13	7	29.7	2.7	27	720802	34	850826

TABLE 5-7
(continued)

Segment	No.of obs	Avg	St dev	min	date	max	date
T14	4	30.7	2.1	28	890718	34	850805
T15	103	29.9	2.3	21	630709	36	660714
T16	3	30.5	0.71	30	790706	32	860714
T17	4	29.3	1.4	27	740806	31	740731
T18	35	30	2.1	21	630709	33	640812
W1	45	29.5	1.2	26	890809	32	810804
W2	45	30.1	1.5	25	820809	33	830803
W3	10	29.6	0.97	28	780801	31	880718
W4	49	29.2	1.3	26	850828	34	790719
W5	8	29.1	1.4	26	870708	31	750821
W6	56	30.1	1.4	27	640730	32	660719
W7	51	30.1	1.9	25	820809	35	870818
W8	22	30.3	1.2	28	720706	32	720821
W9	65	29.8	1.2	27	870708	32	720821
W10	106	29.6	1.2	26	830715	32	720821
W11	79	29.6	1.7	26	830714	34	830824
W12	59	30.3	1.3	28	880707	34	830728
W13	18	29.9	1.5	27	640730	32	770726
W14	15	29.6	2.8	21	760820	33	500830
W15	47	29.9	1.3	27	870708	32	660719
W16	109	29.7	1.3	26	890809	34	810817
W17	26	30.2	2.3	26	890809	36	790716
W18	18	30.1	1.9	28	840830	36	640708
W19	17	29.9	1.1	28	650805	32	640709
W21	62	28.3	1.8	18	610801	31	870820

TABLE 5-8
WQSAL Period of Record Statistics for Hydrographic Segments
Salinities in upper 1.5 m (5 ft)

Segment	No.of obs	Avg	St dev	min	date	max	date
C1	391	6.53	5.3	0	790328	22	881220
C2	858	10.6	5.8	0.1	580127	28	881205
C3	101	9.57	6.4	0	851112	21	631015
C4	172	9.41	5.8	0.1	610111	23	631104
C5	813	12.2	6.1	0.1	601229	30	881205
C6	203	10.5	6	0	870615	26	840919
D1	365	5.71	4.9	0	790109	20	651201
D2	281	11	6.3	0	790605	26	650922
D3	353	14.8	6.4	0	790730	31	881109
D4	370	14	6.1	0	791001	29	850909
D5	82	13.3	5.5	0.8	730220	26	710629
E1	1678	14.5	5.8	0	890727	29	850909
E2	1394	14	5.6	0	890718	28	810511
E3	656	14.7	5.7	0.51	890706	27	630905
E4	975	13	5.5	0	870129	28	881207
E5	232	14.9	6.5	0.6	660517	28	630524
E6	19	9.92	7.6	0	790820	26	800917
E8	128	10.1	6.1	0.8	630122	24	651102
E9	74	18.5	5.8	5	890828	28	631121
E10	5	17.2	4.3	10	851219	22	860423
G1	349	15.8	5.4	0	900522	26	631203
G2	88	13.8	5.4	0.29	851105	25	810219
G3	405	14.5	5.6	0	890522	28	851016
G4	725	14.6	6	0	820525	34	630313
G5	516	14.3	6	0	861229	29	880808
G6	481	15.3	5.9	0	890605	29	890103
G7	1653	15.9	6.6	0.9	850108	36	710720
G8	304	19.5	6.7	0.4	641214	33	840910
G9	417	22.2	6.5	1	890710	39	850909
G10	357	15	5.8	0	870615	26	850904
G11	50	15.3	5.6	0	861229	25	871117
G12	72	15.5	6.6	0	900522	28	870903
G13	760	13.8	6.4	0.3	740131	30	850813
G14	344	14.4	6.2	1	680708	30	881011
G15	419	14.8	6	0	890605	29	890103
G16	129	15.3	6.1	0.16	861106	39	881213
G17	115	13.1	6.3	2.6	790612	28	850813
G18	805	15.1	6.8	0	900522	39	700324
G19	526	14.1	7.1	1	861201	33	630916
G20	317	18.6	7	3.1	660525	34	630819
G21	77	26.8	5.6	14	630220	35	630821
G22	249	11.7	6.1	0	820603	28	900118

TABLE 5-8
(continued)

Segment	No.of obs	Avg	St dev	min	date	max	date
G23	655	12.7	6.2	0	790620	27	890104
G24	563	12.2	6.5	0	860707	29	890104
G25	297	15	6.8	0.47	770505	26	630910
G26	380	13.9	6.7	0	890629	27	850826
G27	370	15.7	6.9	0	500605	34	880808
G28	236	17.8	6.1	0.2	660524	31	660308
G29	845	19.6	7.8	0	890710	40	850909
G30	830	11.6	7.1	0	860618	29	740412
G31	416	17	6.1	0.49	890706	31	881118
G32	494	17.6	6.4	0	790607	45	580409
G33	30	19.8	6.2	7.7	730511	30	640720
G34	368	23.4	6.5	4.4	660516	36	640901
G35	180	25	6.3	3.1	660524	40	850909
G36	232	27.5	4.8	12	630220	39	710720
G37	48	24.4	5.4	12	900509	37	870820
G38	2	20	0	20	890426	20	890426
H1	692	13	6.1	0.18	590416	25	850813
H2	87	12.4	5.7	2	890712	25	810407
H3	103	12.1	5.8	0	870615	25	840918
H4	84	10.9	5	1.4	790416	20	880620
H5	132	10.7	5.2	0.68	750516	24	810407
H6	16	12.6	6.2	2	750418	22	871110
H7	498	9.81	5.5	0.1	590415	27	690715
H8	266	7.79	5.5	0.14	580506	24	810407
H9	5	8.4	7.8	0	870615	20	900319
H10	504	6.55	4.7	0	860610	21	810407
H11	434	10.2	5.7	0.24	830523	25	750319
H12	153	8.7	5.6	0.067	580116	21	650915
H13	450	9.04	5.3	0.14	571017	23	650915
H14	225	7.83	4.6	0.18	590410	21	691202
H15	342	7.36	4.3	0.19	830523	28	821215
H16	73	8.11	3.9	1.4	690520	20	691202
H17	799	5.68	3.8	0.049	870617	17	691202
H18	79	1.84	1.9	0.063	800520	6.1	840711
H19	416	3.29	3.2	0.031	851216	18	691202
H20	674	0.911	1.6	0.015	870617	19	760114
M1	3	27.7	3.3	23	880128	30	881222
M3	145	29.5	4.4	12	750507	37	630821
M4	1	20	0	20	880927	20	880927
M6	2	19	0	19	830509	19	830509
S1	90	7.45	5	0.071	580227	20	691202
T1	677	10.6	6.7	0	790620	26	871110
T2	582	8.18	6	0	760608	27	631014

TABLE 5-8
(continued)

Segment	No. of obs	Avg	St dev	min	date	max	date
T3	259	6.96	5.8	0	660618	24	710615
T4	333	10.1	6.5	0	850402	27	890104
T5	453	9.13	6.8	0	850412	29	720223
T6	602	5.34	5.6	0	650520	25	860324
T7	159	4.2	4	0	660515	16	670115
T8	549	1.89	2.7	0	660315	37	670506
T9	464	0.39	1	0	660416	17	721204
T10	1013	10.3	6.8	0	790612	27	890104
T11	3486	3.61	5.3	0	560810	31	881215
T12	1274	3.22	4.5	0	790416	20	561029
T13	42	6.45	5.2	0	841128	18	651201
T14	58	11.4	6	0	790523	22	850918
T15	686	7.96	6.3	0	790417	28	810115
T16	38	8.99	5.9	0	790706	22	810427
T17	21	3.69	6.1	0.1	750106	23	881115
T18	199	7.2	6	0	740109	22	631120
W1	410	24.1	6.4	2.9	860430	37	860822
W2	440	22.4	7.9	0	790925	38	810324
W3	88	15.6	7.7	0	830914	34	720824
W4	324	25.9	5.9	2.7	850923	38	680820
W5	107	24.3	5.8	3.2	790926	34	850910
W6	299	19.3	7.1	0	790925	39	640331
W7	479	15.9	7.5	0	790925	37	860930
W8	192	9.37	6.3	0	790925	27	810324
W9	383	22.9	6.3	2.6	850923	37	630807
W10	656	22.6	6.3	2.7	850923	42	850625
W11	531	21.1	6.2	5	790925	35	850911
W12	443	18.8	6	0.43	880707	36	510815
W13	135	20	5.8	6.9	790925	35	850912
W14	162	20.9	5.9	2.3	860415	33	860814
W15	358	20.3	6.1	2.7	850923	37	850808
W16	775	22.6	6	1	850923	37	870820
W17	172	21.6	6.1	2	890606	47	580409
W18	217	21.8	5.7	7.1	790605	37	871120
W19	139	22.3	5.7	6.5	790605	39	710720
W20	38	18.8	6.6	6	810925	32	870427
W21	542	18.8	5.7	0.65	810713	35	501215

TABLE 5-9
WQSAL Period of Record Statistics for Hydrographic Segments
Average summer (July-September) salinities within upper 1.5 m

Segment	No. of obs	Avg	St dev	min	date	max	date
C1	94	7.3	5.5	0.072	760714	19	640818
C2	224	10.5	5.7	0.2	610712	22	630924
C3	29	9.86	6.3	0.1	580929	21	640915
C4	48	8.5	5.5	0.2	590730	21	880711
C5	194	11.6	5.8	0.3	590730	24	710721
C6	43	9.23	7.3	0.56	870708	26	840919
D1	71	3.96	3.8	0.061	790724	16	650916
D2	64	11.3	6.2	0	790925	26	650922
D3	87	15.9	6.6	0	790730	26	840927
D4	82	14.8	6.3	0.47	790809	29	850909
D5	14	12	4	5	890912	18	500912
E1	357	14.5	6.7	0	890727	29	850909
E2	313	13.8	6.3	0	890718	28	850909
E3	207	15.4	5.8	0.51	890706	27	630905
E4	210	12.4	6	1	660816	24	710721
E5	47	17	5.8	2	830922	25	630711
E6	3	8.7	12	0	790820	26	800917
E8	30	12.5	3.1	6.7	650830	19	650914
E9	17	18.6	5.4	5	890828	26	630826
G1	77	18.1	4.8	6	890912	25	850904
G2	21	15.8	4.7	3.4	890711	21	880711
G3	78	15.8	5.8	2	890706	26	850806
G4	136	16.1	5.4	1	790905	26	880808
G5	115	15.2	5.7	1.8	890705	29	880808
G6	106	16.6	5.9	0	890712	26	630923
G7	373	17.8	6.9	1	890710	36	710720
G8	68	22.7	6.6	6	890809	33	840910
G9	99	25.7	7.7	1	890710	39	850909
G10	94	17	5.5	0.94	890705	26	850904
G11	9	17.8	5.9	4	860707	24	850904
G12	17	14.6	7.5	0.76	890705	28	870903
G13	140	15.5	6.2	1	890706	30	850813
G14	73	15.2	6	1	680708	28	870902
G15	102	16.3	5.2	5	860707	27	630910
G16	42	16.1	5	6.1	680716	28	690715
G17	21	16.1	5.8	7	870701	28	850813
G18	187	17.2	5.8	0.79	680701	30	880808
G19	95	17.5	7.1	2.2	890706	33	630916
G20	68	22.2	6.6	5.8	790926	34	630819
G21	17	32.5	2.5	27	630923	35	630821
G22	56	11	6.8	0	890706	26	840918
G23	142	13.2	5.7	0	860707	23	640915

TABLE 5-9
(continued)

Segment	No. of obs	Avg	St dev	min	date	max	date
G24	130	13.5	6.3	0	860707	28	630903
G25	61	15.7	6.9	1	860707	26	630910
G26	83	15.4	7.2	0.19	890705	27	850826
G27	80	16.9	8	0.22	890705	34	880808
G28	52	20.3	6.8	6	860716	31	630822
G29	216	22.2	8.2	0	890710	40	850909
G30	165	13.9	6.7	0	890717	27	710720
G31	106	17.7	6.5	0.49	890706	26	630911
G32	112	18.2	6.9	3.5	890719	34	850828
G33	7	20.2	5.9	14	750806	30	640720
G34	83	26.9	6	10	890719	36	640901
G35	43	29.1	5	15	890706	40	850909
G36	56	30.3	4.8	22	660801	39	710720
G37	12	29.3	4	22	890815	37	870820
H1	200	14.6	5.4	1.2	590729	25	850813
H2	25	11.6	5.6	2	890712	19	880727
H3	39	12.8	5.9	3	860710	25	840918
H4	25	11.3	4	3.3	870720	18	880705
H5	42	10.8	4.3	1.8	730911	19	870928
H6	3	12.7	4.6	8	870803	19	880928
H7	190	11.9	4.3	1.1	590729	27	690715
H8	71	8.38	4.9	1.1	590729	19	760831
H10	109	7.14	4.3	0.57	590729	18	850923
H11	135	12	4.5	0.68	730711	22	630924
H12	60	11.7	3.6	0.77	590729	21	650915
H13	141	10.8	4.6	0.65	730711	23	650915
H14	70	8.76	4	0.41	730711	18	690819
H15	120	8.02	3.5	0.27	730711	15	720802
H16	40	8.82	2.8	2	760922	18	690819
H17	262	5.62	3.6	0.054	830914	15	880919
H18	40	3.07	2	0.069	790821	6.1	840711
H19	122	2.9	2.4	0.058	830914	11	750812
H20	225	0.685	0.94	0.029	870715	5.3	900813
M3	28	33.1	3.3	24	750916	37	630821
S1	31	9.81	3.3	2.2	680716	16	690819
T1	140	11.2	6.4	0	790706	25	880920
T2	129	8.07	5.3	0	860707	20	720913
T3	60	6.91	5.5	0	750709	21	710720
T4	75	10.5	6.1	0	870702	25	850918
T5	105	9.44	6.2	0	870716	23	710817
T6	145	5.43	5.1	0	750709	18	650803
T7	36	4.17	4	0.1	660701	13	670919
T8	126	1.82	2.2	0	750709	9.6	670923

TABLE 5-9
(continued)

Segment	No.of obs	Avg	St dev	min	date	max	date
T9	113	0.443	0.78	0	750709	4.5	670819
T10	188	12.1	7	0	860707	25	710913
T11	1204	3.91	4.9	0	560810	22	640916
T12	495	3.98	4.7	0.034	570705	17	560803
T13	7	4.33	3.4	1.3	650715	10	650916
T14	15	14.3	4.2	6	890718	22	850918
T15	151	7.61	6	0	790828	24	650916
T16	7	8.29	5.6	0	790706	15	840925
T17	4	0.7	0.39	0.1	750819	1.1	740904
T18	47	6.3	5.8	0.1	750819	20	630925
W1	75	26.1	6.9	9	880725	37	860822
W2	90	23	10	0	790925	37	510815
W3	17	14	8.4	0	830914	34	720824
W4	82	28.2	8.5	2.7	850923	38	680820
W5	20	25.5	9.1	3.2	790926	34	850910
W6	68	21.5	8.5	0	790925	36	710712
W7	90	16.1	9.8	0	790925	37	860930
W8	51	8.85	6.4	0	790925	20	800925
W9	92	26.2	7.8	2.6	850923	37	630807
W10	156	24.3	8.3	2.7	850923	41	710720
W11	95	23.7	8	5	790925	35	850911
W12	75	19.4	7.2	0.43	880707	36	510815
W13	27	23.3	7.3	6.9	790925	35	850912
W14	38	21.3	7.9	2.7	850923	33	860814
W15	71	24.3	6.8	2.7	850923	37	850808
W16	200	26	5.8	1	850923	37	870820
W17	31	22.7	7.3	6	830929	34	630805
W18	62	24.9	5.3	11	700922	35	850909
W19	36	25	5.3	11	790924	39	710720
W20	11	14.7	7.4	6	810925	28	870820
W21	121	20.9	6.6	0.65	810713	34	600706

TABLE 5-10
WQDO Period of Record Statistics for Hydrographic Segments
Dissolved oxygen in upper 0.5 m (1.5 ft)

Segment	No. of obs	Avg	St dev	Min	date	Min >0	date	Max	date
C1	157	7.47	2.5	0.7	630827	0.7	630827	16	750916
C2	198	8.91	2.6	2.6	630723	2.6	630723	19	770120
C3	6	6.95	2.7	3.2	630723	3.2	630723	12	880524
C4	4	7.98	1	6.3	880711	6.3	880711	9	871105
C5	263	8.18	2.3	2.2	860724	2.2	860724	18	800304
C6	70	7.43	2.2	2.5	841005	2.5	841005	13	840919
D1	133	7.15	2.4	1.4	730731	1.4	730731	15	800108
D2	133	8.73	2.4	4.4	720705	4.4	720705	20	790306
D3	106	8.07	2.4	2	800924	2	800924	15	861119
D4	265	8.35	2.3	2	850823	2	850823	19	790306
D5	44	8.81	2.5	4.8	900428	4.8	900428	16	841114
E1	608	8.36	2.1	3	850424	3	850424	17	860313
E2	587	8.22	2.1	3	850725	3	850725	15	820921
E3	120	8.32	2.3	3	850923	3	850923	15	780413
E4	165	8.03	2.3	3	850416	3	850416	15	760122
E5	42	7.92	2	3	850805	3	850805	14	860116
E6	18	8.77	3.1	3	851014	3	851014	15	841207
E8	5	5.38	0.82	4	850610	4	850610	6.4	880418
E9	11	7.69	2.3	5.2	890526	5.2	890526	12	860326
E10	5	7.44	3.5	3.3	860423	3.3	860423	12	841207
G1	74	8.41	2.9	2	850604	2	850604	15	900110
G2	72	8.59	2.8	3	850603	3	850603	18	810219
G3	213	9.09	2.6	4	850702	4	850702	18	840126
G4	206	8.63	2.8	1	850530	1	850530	17	770120
G5	136	8.82	2.4	4	850904	4	850904	16	861106
G6	169	7.7	2.1	2	850904	2	850904	14	760325
G7	484	8.12	2.4	2.3	860423	2.3	860423	19	870210
G8	97	8.48	2.1	4	850722	4	850722	16	780120
G9	233	7.84	2	3	850620	3	850620	16	770124
G10	141	8.06	2.2	3	851022	3	851022	14	880216
G11	37	8.46	2.2	4	850702	4	850702	14	880216
G12	61	8.43	2.1	3	860828	3	860828	13	860203
G13	147	7.64	2.5	1	850702	1	850702	17	860113
G14	143	8.09	2.4	2	850822	2	850822	15	860113
G15	174	7.25	2.3	1	690923	1	690923	16	880201
G16	94	8.65	2.3	4	680917	4	680917	18	840126
G17	16	9.01	3.5	3	850904	3	850904	14	850417
G18	335	8.56	2	3.6	690730	3.6	690730	17	900212
G19	61	8.63	2.7	4	630514	4	630514	18	870210
G20	62	8.39	2.5	5	851204	5	851204	16	860113
G21	3	8.37	1.5	6.5	860724	6.5	860724	10	860321
G22	132	8.89	2.5	4.2	830125	4.2	830125	17	821020

TABLE 5-10
(continued)

Segment	No.of obs	Avg	St dev	Min	date	Min >0	date	Max	date
G23	117	7.83	2.6	0.8	860924	0.8	860924	16	870218
G24	253	8.75	2.4	3	851022	3	851022	18	840126
G25	131	8.46	2.6	1	851118	1	851118	16	860303
G26	272	8.47	2.3	3	850918	3	850918	15	850417
G27	301	8.13	2.1	3	850509	3	850509	15	860113
G28	102	7.9	2.3	2	850618	2	850618	14	860120
G29	204	8.15	1.9	3	851204	3	851204	14	680411
G30	258	8.59	2.7	3	850423	3	850423	19	860113
G31	284	8.14	2.1	3	850725	3	850725	17	860313
G32	222	8.12	1.8	3	851107	3	851107	13	850403
G33	12	7.88	2	5	850610	5	850610	12	881025
G34	37	7.1	1.9	2	850508	2	850508	11	900222
G35	197	8.42	1.7	4.4	890606	4.4	890606	14	810219
G36	39	7.18	1.4	3.8	720215	3.8	720215	10	711221
G37	32	8.37	2.3	5.6	880817	5.6	880817	15	840127
G38	2	6.9	0.7	6.2	890427	6.2	890427	7.6	890426
H1	357	7.14	2.3	1.2	700324	1.2	700324	15	590113
H2	68	7.84	2	3.7	800729	3.7	800729	13	870423
H3	69	8.08	2.9	1.3	640601	1.3	640601	19	851002
H4	68	9.22	3.1	4.2	840711	4.2	840711	19	800107
H5	89	7.96	1.9	3.7	800729	3.7	800729	13	771018
H6	9	8.14	2.1	6	751023	6	751023	13	870414
H7	659	5.43	2.7	0	590410	0.25	690520	18	580327
H8	215	9.03	3.3	1.4	590512	1.4	590512	19	590318
H9	4	6.25	0.68	5.1	870616	5.1	870616	6.8	900319
H10	592	8.34	3.5	0.94	580908	0.94	580908	20	771018
H11	464	4.9	2.5	0	690715	0.05	691216	12	870423
H12	204	4.31	2.9	0	630521	0.3	630624	13	580327
H13	587	5.39	3.4	0	650824	0.1	710624	15	700210
H14	272	2.02	1.6	0	580224	0.1	700113	7.9	590205
H15	265	2.71	1.8	0	730322	0.1	720504	9.6	870423
H16	66	1.1	1.2	0	680820	0.6	760512	5	901026
H17	624	2.32	1.9	0	680820	0.1	700310	16	840710
H18	77	3.75	3.5	0	760707	0.1	820804	15	790619
H19	326	2.2	2.4	0	680820	0.05	770823	10	851216
H20	510	3.74	2.7	0	720504	0.1	720802	13	800212
M1	3	8.6	0.43	8.2	881222	8.2	881222	9.2	880128
M3	17	7.29	0.75	6	750825	6	750825	8	751007
M4	1	9	0	9	880927	9	880927	9	880927
M6	2	7.5	1.5	6	830509	6	830509	9	830510
S1	74	5.07	3	0	580224	0.4	700310	11	850227
T1	210	8.82	2.5	0	860916	2	851118	19	851025
T2	197	9.03	2.5	2	851118	2	851118	20	700310

TABLE 5-10
(continued)

Segment	No. of obs	Avg	St dev	Min	date	Min >0	date	Max	date
T3	13	9.74	1.7	7	850918	7	850918	13	850207
T4	102	8.71	2.4	2	851118	2	851118	16	850412
T5	151	9.28	2.6	3	851118	3	851118	17	690114
T6	54	8.81	2.7	3	851118	3	851118	18	760226
T7	2	8.5	1.5	7	851216	7	851216	10	871208
T8	59	9.38	1.7	5	760128	5	760128	14	751001
T9	212	8.31	2.1	4	880811	4	880811	17	800107
T10	211	8.48	2.4	0	870218	3	850918	17	860110
T11	117	8.4	2	3.3	860826	3.3	860826	14	690114
T12	71	8.89	2.1	2.7	691202	2.7	691202	15	781217
T13	2	7.4	1.4	6	841128	6	841128	8.8	761208
T14	43	8.54	3.1	3	841219	3	841219	16	850917
T15	210	8.87	2.6	2	850509	2	850509	19	820414
T16	36	9.78	3	4	830621	4	830621	20	840925
T17	7	9.3	2.8	6	881115	6	881115	14	860324
T18	9	9.12	2.4	3.5	640716	3.5	640716	12	790110
W1	264	7.79	2.3	2	850521	2	850521	16	860430
W2	315	7.88	2	2	841128	2	841128	14	800919
W3	45	7.43	2.8	1	850422	1	850422	14	680501
W4	217	8.04	1.8	2	850605	2	850605	14	870319
W5	81	8	2.1	1	850621	1	850621	14	870128
W6	90	7.58	1.8	4.4	690731	4.4	690731	12	780119
W7	311	8.21	2.3	1	820531	1	820531	18	790703
W8	117	8.29	1.9	0.5	830825	0.5	830825	14	750206
W9	179	7.96	1.9	1	850621	1	850621	14	780706
W10	337	7.85	2.2	1.9	860922	1.9	860922	20	870318
W11	268	7.85	2.4	1.3	860922	1.3	860922	19	860225
W12	123	7.85	3.1	0	790313	4	831026	15	780208
W13	67	7.62	1.8	2	850912	2	850912	13	860407
W14	145	7.91	2.6	1	850612	1	850612	20	811204
W15	139	8.19	1.8	4.7	870529	4.7	870529	13	741203
W16	471	7.9	2	0.8	690819	0.8	690819	17	790702
W17	96	8.43	2.3	2.3	860922	2.3	860922	14	750220
W18	122	7.18	2.2	0.4	710929	0.4	710929	13	810304
W19	104	7.73	1.7	3	850508	3	850508	14	750214
W20	34	7.35	1.9	1	850621	1	850621	11	881010
W21	122	7.46	2.2	0.5	850808	0.5	850808	14	841218

TABLE 5-11
 WQDODEF Period of Record Statistics for Hydrographic Segments
 DO deficit in upper 0.5 m (1.5 ft)

Segment	No.of obs	Avg	St dev	min	date	max	date
C1	125	0.972	2.6	-8.7	780531	6.7	630827
C2	191	-0.716	2.3	-9.2	850813	5.7	830104
C3	4	2.63	0.95	1.2	900214	3.8	630723
C4	4	-0.66	0.69	-1.2	871105	0.49	880711
C5	259	0.132	1.8	-8	800304	6.3	700324
C6	55	0.486	2.1	-6	840919	4.6	841128
D1	122	1.77	2.6	-6.7	720419	6.3	881031
D2	124	-0.362	2.1	-11	790306	3.8	831107
D3	83	-0.294	2.4	-7.3	770106	5.5	860423
D4	199	-0.226	2.2	-10	790306	5.7	730227
D5	42	-0.661	2.5	-7.7	841114	4.1	900428
E1	605	-0.16	1.8	-8.5	860313	6.7	870126
E2	587	0.0623	1.7	-7.7	820921	4.4	870508
E3	119	-0.168	1.8	-6.9	780413	4.2	850924
E4	165	0.189	2.2	-7.7	820921	6.5	770208
E5	42	0.25	1.8	-4.4	860116	4.1	821104
E6	18	-0.568	3	-7.2	860428	4.2	851014
E8	5	2.03	0.57	1.1	850710	2.8	850610
E9	11	-0.0882	1.9	-4.4	860326	2	890526
E10	5	1.22	2.2	-1.9	841207	3.9	860423
G1	74	-0.171	2.7	-5.9	690520	5.8	851121
G2	8	0.625	2.9	-3.5	860305	4.4	850603
G3	212	-0.715	2.2	-8.9	780508	3.4	831215
G4	199	-0.364	2.5	-8.6	800321	6.4	850530
G5	134	-0.514	2.1	-7.5	861106	3.7	850121
G6	168	0.237	1.8	-6	760325	5.8	870316
G7	388	0.205	1.8	-10	870210	5.8	700929
G8	97	-0.449	1.9	-5	870210	4	890629
G9	232	0.0634	1.5	-6.1	770124	3.7	851204
G10	139	0.182	1.8	-5.2	860203	5.7	851121
G11	37	-0.01	1.9	-4	860203	3.8	851121
G12	60	-0.24	1.5	-3.9	860203	3.9	860828
G13	142	0.641	2.3	-6.9	860113	7.8	851219
G14	130	0.159	2.1	-5.7	870210	4.5	850822
G15	174	0.86	2.1	-7.3	880201	7.3	690415
G16	94	-0.543	2	-7.4	840126	3.7	690415
G17	16	-0.731	3.5	-6	850417	7.9	851219
G18	176	-0.355	1.7	-8.5	900212	6.8	851219
G19	49	-0.28	2.3	-8.9	870210	3.3	870617
G20	58	-0.232	2.2	-6.5	860113	5.5	870126
G21	3	-1.26	0.83	-2	860724		
G22	133	-0.533	2.6	-11	810202	5.7	830125

TABLE 5-11
(continued)

Segment	No.of obs	Avg	St dev	min	date	max	date
G23	117	0.437	2.4	-6	870218	6.6	851022
G24	251	-0.322	1.9	-7.2	840126	4.6	851022
G25	131	0.0142	2.1	-6.5	850412	7.1	851118
G26	268	-0.06	2	-7.2	850417	6.7	851219
G27	290	0.166	1.7	-6.1	850417	6.8	860212
G28	100	0.136	1.8	-5.3	860120	5.4	851219
G29	199	-0.351	1.7	-6	810420	5.9	851204
G30	248	0.0243	2.3	-9.5	860113	5.5	851219
G31	279	0.00047	1.8	-8.5	860313	5.6	860120
G32	169	0.114	1.6	-4.6	850403	5.6	870217
G33	12	-0.356	1.9	-5	881025	2.2	851011
G34	32	0.462	1.5	-2.1	900222	4.9	850508
G35	43	-0.287	0.99	-2.5	861213	2.4	890606
G36	38	0.414	0.69	-1.6	711221	1.5	711019
G37	1	-4.02	0	-4	840104		
G38	2	0.6	0.76	-0.16	890426	1.4	890427
H1	311	1.09	2.1	-6.1	870212	8.4	700324
H3	68	-0.102	2.9	-11	851002	5.8	850524
H4	68	-0.939	2.8	-9.1	800107	3.7	850102
H5	89	0.199	2	-5	771018	4.6	830125
H6	9	-0.407	1.9	-4.7	870414	1.9	751023
H7	331	2.41	2.6	-9.3	580327	8.5	581218
H8	167	-0.379	3.3	-9.9	590318	6.8	590512
H9	4	2.26	0.82	1.1	900319	3.4	870616
H10	368	-0.202	3.4	-13	580911	7.5	590129
H11	299	2.85	2.2	-4.3	870423	9.9	700113
H12	104	3.84	2.1	-3.7	580327	8.1	580320
H13	320	4.46	2.1	-4.9	580327	9.5	700112
H14	206	6.29	1.6	0.25	700609	9.7	700113
H15	259	5.61	1.3	-1.6	870423	8.7	730322
H16	65	6.87	1.2	4.5	900126	9.9	700113
H17	585	5.96	1.6	-8.5	840710	9.8	700113
H18	71	4.4	3.3	-7.3	790619	7.8	790725
H19	323	6.3	2	0.41	701020	9.9	700113
H20	495	4.98	2.1	-0.6	800212	9.5	750219
M1	3	-0.0733	0.67	-0.63	880128	0.87	900112
M3	17	-0.0347	0.75	-0.91	751007	1.1	760331
M4	1	-2.31	0	-2.3	880927		
M6	2	0.145	1.4	-1.3	830510	1.6	830509
S1	62	3.38	2.7	-3.2	840711	9.1	700210
T1	210	-0.162	2.1	-11	851025	7.4	860916
T2	197	-0.449	2.2	-11	700310	6.2	851118
T3	114	-0.266	1.3	-3.4	780424	4	751216

TABLE 5-11
(continued)

Segment	No.of obs	Avg	St dev	min	date	max	date
T4	83	-0.143	2.3	-7.3	850412	6	851118
T5	151	-0.659	2	-7.7	701020	5.2	851118
T6	144	0.248	2.1	-9	760226	5.1	851118
T7	2	1.57	2.4	-0.86	871208	4	851216
T8	59	0.0302	2.2	-5	751001	7.2	760128
T9	211	0.65	1.6	-6.3	800107	5.4	850102
T10	210	-0.001	2.2	-6.3	860110	10	870218
T11	218	0.223	1.4	-4.9	810219	6.2	870129
T12	100	0.143	1.6	-5.2	781217	6.9	691202
T13	11	0.45	1.3	-1.5	761021	3.4	841128
T14	54	-0.367	2.9	-9	850917	5.1	841219
T15	207	-0.537	2.3	-11	820414	5.8	850510
T16	38	-1.5	3.1	-13	840925	3.9	830621
T17	4	-0.477	2.8	-5.3	860324	1.4	881115
T18	3	1.31	1.9	-0.1	790110	4	640716
W1	239	-0.357	2.3	-9	851113	5.6	820205
W2	251	-0.357	1.9	-7.3	800919	6.9	841128
W3	45	0.387	2.7	-6	680501	6.8	850422
W4	217	-0.473	1.5	-6.7	870319	4.2	850605
W5	81	-0.383	1.7	-5.5	870318	5.8	850621
W6	89	0.114	1.9	-7.1	710930	5.3	700113
W7	237	-0.281	2.3	-10	790703	6.5	820531
W8	116	0.052	1.9	-4.5	870413	6.9	830825
W9	225	-0.643	2.1	-12	870318	5.7	850621
W10	290	0.016	1.6	-5.7	861230	11	831228
W11	267	-0.246	2.2	-12	860225	5.8	841218
W12	114	0.218	3.1	-6.1	820922	8.8	790313
W13	67	0.0196	1.6	-5.5	860407	4.4	850912
W14	144	-0.0642	2.2	-11	811204	5.8	850612
W15	139	-0.498	1.6	-4.7	861022	3.1	700114
W16	319	-0.185	2	-10	790702	6	850508
W17	96	-0.657	2	-6.1	820427	5.3	851204
W18	8	-0.838	2.4	-5.7	810304	2.5	851014
W19	63	0.391	1.3	-5.9	881025	4.4	850508
W20	35	0.113	1.8	-4.1	881010	5.6	850621
W21	55	-0.421	2.1	-5.4	841218	5.8	850808

TABLE 5-12
 Period of Record Statistics for Hydrographic Segments
 WQTCOLI with geometric means

Segment	No. of obs	Avg >DL	St dev of log	min	date	max	date
C1	430	1830	1.7	13	630808	1202604	791031
C2	496	683	1.9	2	631021	1202604	791031
C3	76	541	1.9	2	630620	16318	660210
C5	284	852	2.1	2	631008	442413	790327
D1	200	2780	1.5	49	810407	162755	660810
D2	95	571	2.1	5	661205	162755	760714
D3	51	72.7	1.8	2	720919	16318	730307
D4	159	108	2.6	2	710629	59874	730227
D5	53	64.4	2	2	710629	2441	751211
E1	252	7.72	1.4	2	580325	898	730117
E2	317	12.9	1.6	2	630813	14765	760810
E3	78	29.2	1.9	2	630723	1636	680117
E4	161	31.3	1.9	2	580604	2441	580604
E5	24	94	1.7	8	580423	2441	730118
G1	129	90.9	2	2	650823	22026	680917
G2	25	409	2.3	10	750225	59874	780509
G3	162	54.4	1.9	2	580408	4447	770329
G4	230	118	2.1	2	631008	59874	690318
G5	193	28.2	2	2	580326	7332	690415
G6	146	45.5	2.3	2	580326	22026	690318
G7	604	14	1.9	2	580312	2441	680724
G8	69	18.3	1.9	2	630821	4447	500317
G9	108	34.3	2.1	2	631022	22026	690613
G10	133	48.8	1.8	2	630521	2441	740122
G11	8	104	2.2	7	580311	2441	580507
G13	376	32.2	1.9	2	580326	2441	580507
G14	120	16.2	1.8	2	670227	22026	680724
G15	259	147	2.2	1	710316	162755	681119
G16	122	100	1.9	2	690923	59874	690318
G17	22	15.4	1.6	2	710810	2441	740122
G18	437	34.9	1.8	2	630425	22026	680724
G19	293	15.5	1.6	2	630627	2441	580526
G20	214	35.2	1.9	2	630819	8955	680724
G22	92	167	2.1	2	630521	59874	840112
G23	146	50.1	2	2	630717	16318	651209
G24	192	26.2	2.1	2	580326	22026	690218
G26	25	41.6	2.5	2	580422	2441	580526
G27	15	72.4	0.8	37	500510	365	500306
G28	32	34.5	1.6	2	580423	545	580409
G29	343	8.94	1.7	2	580312	2441	580506
G30	292	14.7	1.6	2	580325	1636	730619
G31	21	44	2.2	4	580423	4447	500309

TABLE 5-12
(continued)

Segment	No. of obs	Avg >DL	St dev of log	min	date	max	date
G32	118	11.2	1.4	2	580310	812	580409
G34	147	19.6	1.8	2	630722	1636	630612
G36	119	48.9	2.1	2	680917	5432	700414
G37	14	64	1.2	10	821207	299	820427
H1	323	394	1.9	2	670201	59874	840112
H2	38	633	2	16	730214	59874	840112
H3	54	567	1.8	10	740813	59874	780720
H4	32	1540	2.3	20	750516	59874	790723
H5	40	1130	2.1	10	740813	162755	840112
H7	187	1690	2.3	5	691028	162755	691216
H8	42	1840	1.9	49	850708	162755	840112
H10	41	1190	1.9	30	751125	59874	840112
H11	311	5690	2.1	8	700707	442413	690218
H12	46	11700	1.9	134	630819	442413	651117
H13	170	10300	1.7	90	850708	442413	651117
H14	228	33800	2.3	4	700609	1202604	690218
H15	138	21100	1.7	99	840517	1202604	781108
H16	103	98900	2.2	4	700707	3269017	700210
H17	380	145000	2	2	700707	8886111	740117
H18	50	42500	2.5	81	731106	3269017	761005
H19	273	245000	2.2	8	700707	6.6 E 7	750219
H20	233	166000	2.1	99	790122	2.4 E 7	760127
S1	106	15800	2.4	11	700707	1202604	700210
T1	46	15.6	1.6	2	700226	545	720117
T2	299	39.2	2.2	2	630812	59874	680917
T3	57	239	2.3	2	710615	19930	790807
T4	239	12	1.8	2	580311	2441	580603
T5	205	22.9	2	2	631014	18034	681015
T6	118	127	2.1	2	660908	5432	690415
T9	50	1650	2.1	20	770125	442413	790104
T10	439	17.7	1.8	2	580526	5432	690218
T11	376	42	2.1	2	630717	16318	690218
T12	34	45.2	2	2	700707	1808	700414
T15	48	431	1.7	2	580611	22026	740806
T17	23	1990	0.9	365	760310	22026	740109
T18	43	1580	1.2	164	810406	22026	731015
W1	83	4.8	1.5	2	680925	8103	750206
W2	96	25	2.2	2	690210	12088	780914
W3	23	57.2	2.1	2	760908	16318	730226
W4	57	11.7	2.1	2	680716	1636	690318
W5	17	31.3	1.3	10	740529	1212	790926
W6	242	12.1	1.9	2	630724	3294	690318
W7	163	97.8	2.1	2	640331	22026	780607

TABLE 5-12
(continued)

Segment	No. of obs	Avg >DL	St dev of log	min	date	max	date
W8	85	794	1.7	10	830425	59874	780607
W9	116	3.63	1.2	2	630724	270	641214
W10	227	7.68	1.7	2	630724	4024	780914
W11	175	11.1	1.8	2	630724	1636	650614
W12	223	12.5	1.6	2	630807	5432	820111
W13	55	10.8	1.6	2	630724	898	701014
W14	23	142	1.4	37	500614	2441	510726
W15	171	38.7	2	2	630724	2441	511019
W16	473	643	3.1	2	631113	8886111	690819
W17	61	14.4	1.8	2	580312	2441	580603
W18	96	55.6	1.8	2	631113	22026	760514
W19	144	15.7	1.5	2	650119	8103	680716
W21	320	69	2.1	2	760202	442413	750107

TABLE 5-13
 Period of Record Statistics for Hydrographic Segments
 WQFCOLI with geometric means

Segment	No.of obs	Avg >DL	St dev of logs	min	date	max	date
C1	195	223	1.9	4	810224	59874	791031
C2	250	75.9	1.9	2	760205	59874	791031
C3	18	41.9	1.7	5	780711	1636	860206
C5	202	117	1.9	2	850626	59874	750717
D1	155	361	1.7	7	810407	59874	890130
D2	73	130	1.8	2	740710	5432	730307
D3	162	16.6	2.1	2	751021	5432	730307
D4	216	15.9	2.1	2	710629	59874	730227
D5	62	8.27	1.8	2	710629	1636	751211
E1	389	3.02	0.94	2	701020	245	740213
E2	391	4.12	1.2	2	680716	735	890719
E3	45	10.2	1.9	2	750813	898	750115
E4	106	7.07	1.7	2	740611	1636	730117
E5	2	91.3	0.62	49	730118	164	730118
G1	128	17.1	2	2	680716	7332	690218
G2	60	26.3	1.4	5	740221	2981	890711
G3	168	8.82	1.6	2	710623	1636	740122
G4	259	29.4	2	2	680716	4915	690318
G5	335	7.06	1.6	2	680716	1636	740122
G6	237	21.6	2	2	680820	13360	690318
G7	973	4.47	1.3	2	680402	1636	830912
G8	47	3.52	1	2	750310	134	910207
G9	57	23.8	1.9	2	680716	493	690715
G10	101	7.18	1.5	2	710623	545	740122
G13	491	6.21	1.4	2	680402	1636	881101
G14	227	5.52	1.5	2	680402	545	680411
G15	291	26	2.1	2	680820	22026	690218
G16	138	16.6	1.6	2	680716	4915	690218
G17	123	5.18	1.2	2	730207	365	740122
G18	512	6.79	1.4	2	680402	4024	890711
G19	546	3.65	1.1	2	680402	1636	881101
G20	253	6.67	1.5	2	680402	1636	881101
G22	125	22	1.9	2	740715	4024	800124
G23	170	9.06	1.7	2	691104	1636	740122
G24	219	6.7	1.6	2	680716	3294	690218
G26	2	4.69	0.85	2	860916	11	870127
G29	375	2.89	0.76	2	680402	81	861230
G30	491	3.5	0.99	2	680411	365	720524
G32	104	5.95	1	2	680716	181	890719

TABLE 5-13
(continued)

Segment	No. of obs	Avg >DL	St dev of logs	min	date	max	date
G34	123	3.33	0.93	2	740522	365	720214
G36	119	24.2	1.8	2	680716	2981	681119
G37	16	34.6	1.6	5	881109	992	900509
H1	341	41.8	1.7	2	780719	9897	720516
H2	55	47.3	1.4	10	730214	2697	790122
H3	24	26.9	1.5	10	740813	2441	720516
H4	52	82.7	1.9	10	740813	162755	790723
H5	64	40.9	1.7	10	740214	4024	800124
H7	105	446	2.4	2	691028	162755	690520
H8	61	75.1	1.6	10	740813	13360	900711
H10	60	76.2	1.7	10	740813	4447	840112
H11	285	477	2.3	4	700707	162755	690520
H12	1	1300	0	1339	720516	1339	720516
H13	178	496	1.7	10	750930	59874	791023
H14	227	6920	2.6	2	700609	1202604	680917
H15	197	1560	1.9	20	760219	162755	720504
H16	107	35100	2.3	2	700707	3269017	690415
H17	552	8370	2.4	2	700707	3269017	720802
H18	50	11600	2.7	2	731106	1202604	761005
H19	330	20100	2.7	2	700707	3269017	690819
H20	364	6190	2.1	10	821123	1202604	760902
S1	106	3350	2.7	2	700707	162755	700210
T1	92	3.89	1.2	2	691104	245	720516
T2	275	5.55	1.4	2	690218	898	850227
T3	58	33.8	1.6	2	711019	2441	720321
T4	287	3.14	0.9	2	680430	493	730326
T5	199	4.74	1.2	2	680716	365	861203
T6	115	12.5	1.6	2	680820	493	690415
T9	91	94.8	1.5	10	750710	14765	790820
T10	458	3.98	1.2	2	680402	1339	730328
T11	368	6.01	1.5	2	680716	1097	730227
T12	39	12.4	1.2	2	691202	221	870302
T15	36	81.8	2	2	800428	1636	740731
T17	26	208	1.4	16	770622	2441	740325
T18	57	162	1.3	13	810406	2441	740325
W1	164	2.66	0.79	2	710623	365	850321
W2	138	9.2	1.9	2	740508	1636	841015
W3	41	10.9	2	2	760908	8955	730226
W4	68	11.9	1.9	2	680716	898	690318

TABLE 5-13
(continued)

Segment	No. of obs	Avg >DL	St dev of logs	min	date	max	date
W5	14	9.44	0.19	5	740212	10	731113
W6	231	8.79	2	2	680716	2441	910116
W7	123	25.1	2	2	710623	2441	761130
W8	78	113	2	10	750206	22026	721128
W9	130	2.9	0.88	2	710712	164	850321
W10	330	3.91	1	2	680716	270	850321
W11	273	6.43	1.3	2	710712	2441	910116
W12	424	5.67	1.4	2	730124	3294	820111
W13	66	10.6	1.4	2	750915	898	910206
W14	16	51.6	1.7	10	861230	2441	860625
W15	235	10.4	1.3	2	710622	545	910116
W16	448	101	3.2	2	681119	3269017	690819
W17	45	3.16	0.89	2	740522	81	720508
W18	125	9.35	1.5	2	710622	7332	900509
W19	118	7.33	1	2	680716	134	690613
W21	491	22.9	1.9	2	730515	442413	750107

TABLE 5-14

Water temperature (WQTEMP) stratification ($^{\circ}\text{C m}^{-1}$)
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
C1	69	0.007	0.330	69.57	G25	125	0.056	0.150	78.4
C2	106	0.350	0.800	84.91	G26	90	0.228	0.360	94.44
C4	27	-0.476	0.810	92.59	G27	43	0.658	2.100	93.02
C5	169	0.704	1.800	92.31	G28	94	0.289	0.430	85.11
C6	74	0.306	0.400	91.89	G29	196	0.140	0.370	88.78
D1	26	0.064	1.100	57.69	G30	120	0.029	0.200	80.83
D2	107	0.285	0.520	84.11	G31	77	0.333	0.570	92.21
D3	36	0.495	1.500	91.67	G32	121	0.097	0.350	86.78
D4	4	0.033	0.400	75	G33	6	0.060	0.085	100
E1	272	0.238	0.500	91.54	G34	133	0.036	0.085	81.2
E2	218	0.293	0.560	91.74	G35	143	0.072	0.140	86.01
E3	179	0.374	1.200	92.74	G36	109	0.054	0.100	78.9
E4	201	0.354	0.750	94.53	H1	280	0.067	0.100	89.29
E5	97	0.126	0.200	86.6	H3	11	0.799	1.100	100
E8	72	0.492	2.100	90.28	H4	16	0.261	0.460	93.75
E9	64	0.094	0.160	85.94	H5	60	0.230	0.350	85
G1	91	0.510	1.100	87.91	H7	107	0.041	0.120	76.64
G3	102	0.144	0.260	88.24	H8	77	-0.039	0.560	75.32
G4	133	0.495	2.300	86.47	H10	68	0.074	0.470	76.47
G5	164	0.323	0.720	91.46	H11	229	0.026	0.076	85.15
G6	95	0.830	2.700	84.21	H12	18	-0.019	0.100	55.56
G7	150	0.160	0.690	86.67	H13	198	0.039	0.071	83.84
G8	58	-0.007	0.500	67.24	H14	99	0.039	0.078	81.82
G9	180	0.063	0.190	83.33	H15	202	0.059	0.069	88.61
G10	102	0.280	0.410	95.1	H16	39	0.094	0.071	94.87
G12	41	0.033	0.077	73.17	H17	508	0.103	0.360	79.13
G13	93	0.130	0.380	86.02	H18	10	0.212	0.590	70
G14	20	-0.019	0.045	55	H19	229	0.041	0.120	71.18
G15	144	0.051	0.170	80.56	H20	226	0.123	0.490	79.65
G16	81	0.018	0.050	70.37	M1	3	-0.066	0.000	0
G18	167	0.025	0.098	64.07	M3	68	0.040	0.120	75
G19	55	0.120	0.390	80	S1	36	0.048	0.210	63.89
G20	121	0.033	0.089	71.07	T1	109	0.224	0.470	81.65
G21	37	0.052	0.091	75.68	T2	115	0.445	1.800	86.96
G22	39	0.017	0.110	82.05	T3	57	-0.085	0.390	59.65
G23	100	0.169	0.490	86	T4	3	0.310	0.170	100
G24	239	0.115	0.400	82.43	T5	203	0.202	0.360	86.7

(continued)

TABLE 5-14
 Water temperature stratification ($^{\circ}\text{C m}^{-1}$)
 (continued)

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
T6	170	0.482	1.300	85.88	W7	15	-0.112	0.270	80
T9	7	0.036	0.049	85.71	W8	64	0.166	0.780	79.69
T10	120	0.266	1.600	87.5	W9	41	0.214	0.700	87.8
T11	275	0.292	0.510	89.09	W10	148	0.089	0.380	89.19
T12	56	0.264	0.510	85.71	W11	31	0.075	0.370	90.32
T13	8	0.203	0.260	87.5	W14	10	0.385	0.670	100
T15	128	0.095	0.850	92.97	W15	73	0.039	0.088	84.93
T18	41	0.743	1.100	95.12	W16	100	-0.090	0.490	66
W4	105	0.129	0.410	88.57	W19	42	0.003	0.078	61.9
W5	31	0.012	0.170	83.87	W21	65	3.300	3.500	90.77
W6	38	0.069	0.340	71.05					

TABLE 5-15
 Salinity (WQSAL) stratification (ppt m^{-1})
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
C1	65	-0.913	2.100	10.8	G24	232	-0.500	0.590	33.6
C2	107	-0.849	1.000	17.8	G25	127	-0.556	0.590	7.1
C4	27	-0.229	0.310	48.2	G26	88	-0.251	0.300	42.1
C5	168	-0.406	2.500	40.5	G27	40	-0.504	0.520	30.
C6	73	-1.090	1.200	15.1	G28	94	-0.370	1.100	36.2
D1	25	-1.510	1.500	16.	G29	196	-0.624	0.850	33.7
D2	102	-1.310	2.700	17.7	G30	119	-0.151	0.450	42.9
D3	36	-1.040	1.100	44.4	G31	76	-0.473	0.810	40.8
D4	53	-0.407	0.670	34.	G32	164	-0.559	0.640	41.5
E1	269	-0.214	0.430	56.9	G33	7	-0.227	0.230	42.9
E2	217	-0.112	1.100	51.6	G34	136	-0.232	0.430	10.3
E3	176	-0.371	0.650	52.3	G35	143	-0.298	0.330	22.4
E4	200	-0.031	1.100	66.	G36	107	-0.225	0.260	22.4
E5	96	-1.030	1.500	7.3	G37	28	-0.341	0.340	7.1
E8	72	-0.295	0.680	43.1	H1	285	-0.446	0.490	5.6
E9	63	-0.158	0.200	30.2	H2	52	-0.447	0.000	0.
G1	92	-0.681	0.840	53.3	H3	11	-0.124	0.120	63.6
G2	57	-0.606	0.650	3.5	H4	16	-0.080	0.082	68.8
G3	98	-0.255	0.310	25.5	H5	58	-0.309	0.320	19.
G4	128	-0.050	0.850	57.8	H7	103	-0.449	0.930	4.9
G5	162	-0.319	0.440	38.9	H8	76	-0.244	0.320	43.4
G6	91	-0.313	0.770	56.	H10	79	-0.317	0.490	39.2
G7	208	-0.191	0.440	59.1	H11	234	-0.396	0.630	11.5
G8	57	-0.507	0.680	36.8	H12	18	-0.470	0.540	5.6
G9	180	-0.401	0.560	25.6	H13	204	-0.368	0.450	4.9
G10	100	-0.299	0.530	25.	H14	101	-0.486	0.510	5.9
G12	40	-0.613	0.640	7.5	H15	208	-0.352	0.410	5.8
G13	92	-0.195	0.290	38.	H16	39	-0.438	0.510	2.6
G14	20	-0.568	0.000	0.	H17	507	-0.439	0.560	7.7
G15	141	-0.466	0.490	4.3	H18	13	-0.484	0.550	7.7
G16	75	-0.593	1.100	2.7	H19	235	-0.506	0.510	5.1
G18	343	-0.595	0.640	7.3	H20	215	-0.705	0.710	31.2
G19	53	-0.414	0.440	3.8	M1	3	-1.320	0.000	0.
G20	123	-0.453	0.510	4.1	M3	69	-0.163	0.250	24.6
G21	38	-0.207	0.210	10.5	S1	36	-0.042	4.000	16.7
G22	38	-0.403	0.460	21.1	T1	109	-0.402	0.480	40.4
G23	102	-0.446	0.600	43.1	T2	116	-0.548	0.640	45.7

(continued)

TABLE 5-15

Salinity stratification (ppt m⁻¹)
(continued)

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
T3	54	-1.690	1.700	24.1	W5	31	-0.480	0.520	54.8
T4	3	-0.248	0.250	33.3	W6	39	-0.761	0.850	28.2
T5	201	-0.382	0.440	34.8	W7	79	-1.110	3.200	10.1
T6	167	-0.634	3.900	37.7	W8	65	-1.040	1.100	16.9
T9	6	-0.250	0.250	66.7	W9	39	-0.311	0.400	53.9
T10	115	-0.199	2.100	47.8	W10	140	-0.188	0.940	62.1
T11	286	-0.605	0.770	36.7	W11	24	0.414	1.200	66.7
T12	56	-1.310	1.300	42.9	W14	9	-0.193	0.330	55.6
T13	8	0.189	6.200	25.	W15	71	-0.106	0.140	47.9
T15	124	-0.247	0.490	49.2	W16	159	-0.498	1.200	28.3
T18	42	-2.890	2.900	23.8	W18	97	-0.315	0.500	11.3
W1	12	-0.657	1.100	50.	W19	76	-0.426	1.100	11.8
W2	25	-0.531	0.560	44.	W21	66	-1.090	2.000	21.2
W4	98	-0.594	0.890	52.					

TABLE 5-16

Dissolved oxygen (WQDO) stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
C1	67	0.595	1.600	86.6	G32	70	0.255	0.630	71.4
C2	94	0.883	1.300	86.2	G33	4	0.196	0.065	100.
C5	83	0.765	1.700	83.1	G34	7	0.044	0.150	71.4
C6	15	0.192	0.210	86.7	G35	30	0.134	0.210	93.3
D1	23	1.470	2.200	95.7	G36	39	0.038	0.062	82.1
D2	7	0.939	1.100	100.	G37	28	0.101	0.130	92.9
D4	49	0.483	0.510	93.9	H1	216	0.134	0.170	82.4
E1	83	0.234	0.570	84.3	H2	55	0.275	0.280	96.4
E2	84	0.390	1.100	77.4	H3	12	2.440	3.200	100.
E3	42	0.202	0.540	69.1	H4	16	0.975	1.700	81.3
G1	26	0.601	2.400	57.7	H5	60	0.478	0.510	90.
G2	58	0.373	0.230	100.	H7	98	0.080	0.250	71.4
G3	99	0.478	0.600	93.9	H8	66	0.647	1.200	84.9
G4	39	0.312	0.620	79.5	H10	70	1.150	2.000	85.7
G5	64	0.577	0.740	87.5	H11	220	0.079	0.150	76.8
G6	54	-0.081	0.800	57.4	H12	16	0.181	0.200	81.3
G7	88	0.287	0.470	81.8	H13	194	0.042	0.170	52.1
G8	22	0.117	0.120	95.5	H14	96	-0.037	0.200	61.5
G9	83	0.033	0.130	83.1	H15	200	0.026	0.130	62.
G10	37	0.309	0.340	91.9	H16	38	-0.014	0.076	71.1
G12	38	0.181	0.120	97.4	H17	494	0.145	0.350	79.4
G14	18	0.134	0.110	94.4	H18	12	0.210	0.280	100.
G15	103	0.101	0.160	78.6	H19	222	0.154	0.170	96.4
G16	80	0.221	0.170	95.	H20	215	0.470	0.790	85.6
G18	293	0.180	0.250	93.2	M1	3	0.517	0.400	100.
G19	18	0.171	0.210	94.4	M3	4	0.176	0.220	100.
G20	28	0.052	0.065	89.3	S1	35	0.278	0.620	91.4
G22	37	0.384	0.560	83.8	T2	79	0.526	0.940	84.8
G23	14	0.500	0.520	100.	T3	56	0.442	0.790	75.
G24	138	0.553	0.890	87.7	T4	4	0.335	0.450	75.
G25	32	0.358	0.470	87.5	T5	108	0.578	1.100	87.
G26	50	0.414	0.460	94.	T6	79	0.639	1.600	77.2
G27	42	0.321	0.350	90.5	T9	6	0.110	0.150	100.
G29	68	0.188	0.320	88.2	T10	11	0.647	0.610	100.
G30	26	0.195	0.310	84.6	T11	138	0.612	0.990	85.5
G31	39	0.326	0.490	84.6	T12	58	0.468	0.710	86.2

(continued)

TABLE 5-16
 Dissolved oxygen stratification (ppm m⁻¹)
 (continued)

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
T13	8	0.157	0.840	87.5	W10	141	0.135	0.330	74.5
W1	12	0.322	0.600	83.3	W11	27	0.048	0.099	88.9
W2	25	0.257	0.840	72.	W14	9	0.226	0.610	66.7
W4	100	0.153	0.600	66.	W15	64	0.168	0.350	81.3
W5	30	0.263	0.560	86.7	W16	161	0.133	0.430	82.6
W6	38	0.224	0.400	89.5	W17	3	0.051	0.039	100.
W7	77	0.369	0.480	89.6	W18	80	0.202	0.180	91.3
W8	64	0.495	0.520	87.5	W19	76	0.189	0.190	90.8
W9	39	0.231	0.570	76.9	W21	29	0.508	0.540	93.1

TABLE 5-17

WQDODEF stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments with >2 observations

<u>Seg- ment</u>	No. of obs	Avg	St dev	percent positive	<u>Seg- ment</u>	No. of obs	Avg	St dev	percent positive
C1	64	-0.595	2.1	18.8	H4	16	-1.00	1.7	18.8
C2	93	-0.898	1.3	15.1	H5	58	-0.488	0.54	12.1
C5	82	-0.878	1.8	14.6	H7	92	-0.0583	0.26	37.
C6	15	-0.111	0.24	26.7	H8	64	-0.687	1.3	17.2
D1	21	-1.43	2.3	19.1	H10	54	-1.18	1.8	11.1
D2	7	-0.882	1.1	14.3	H11	214	-0.0626	0.17	26.6
D4	4	-1.08	0.96	0.	H12	16	-0.179	0.26	18.8
E1	82	-0.224	0.51	25.6	H13	190	-0.0281	0.16	52.1
E2	82	-0.405	1.1	31.7	H14	96	0.0548	0.25	53.1
E3	41	-0.246	0.53	31.7	H15	196	-0.0132	0.13	41.3
G1	26	-0.591	2	46.2	H16	38	0.022	0.11	50.
G3	95	-0.497	0.62	6.3	H17	475	-0.122	0.34	29.3
G4	37	-0.288	0.52	24.3	H18	12	-0.207	0.28	16.7
G5	62	-0.632	0.85	14.5	H19	219	-0.136	0.17	23.3
G6	53	-0.0317	1.1	45.3	H20	205	-0.454	0.77	15.6
G7	28	-0.05	0.56	39.3	M1	3	-0.452	0.4	0.
G8	21	-0.101	0.12	14.3	M3	4	-0.174	0.21	0.
G9	81	-0.0125	0.24	24.7	S1	35	-0.285	0.83	14.3
G10	36	-0.305	0.37	11.1	T2	80	-0.522	1	21.3
G12	37	-0.158	0.13	2.7	T3	54	-0.348	0.82	35.2
G14	18	-0.101	0.1	5.6	T4	3	-0.804	0.067	0.
G15	100	-0.0837	0.17	27.	T5	106	-0.629	1.2	14.2
G16	76	-0.205	0.17	9.2	T6	77	-0.68	1.6	24.7
G18	123	-0.168	0.16	4.9	T9	6	-0.103	0.13	16.7
G19	15	-0.0993	0.21	20.	T10	11	-0.671	0.62	0.
G20	27	-0.0339	0.056	29.6	T11	136	-0.622	1	14.
G22	36	-0.358	0.56	25.	T12	58	-0.457	0.72	19.
G23	14	-0.488	0.52	0.	T13	8	-0.224	1.4	12.5
G24	133	-0.547	0.91	15.	W4	100	-0.138	0.57	44.
G25	32	-0.332	0.47	15.6	W5	30	-0.239	0.51	23.3
G26	49	-0.432	0.5	8.2	W6	38	-0.198	0.38	15.8
G27	40	-0.38	0.43	15.	W7	14	-0.247	0.35	14.3
G29	67	-0.176	0.3	16.4	W8	61	-0.475	0.51	14.8
G30	26	-0.14	0.4	46.2	W9	39	-0.229	0.53	30.8
G31	38	-0.359	0.49	10.5	W10	136	-0.13	0.35	27.2
G32	26	-0.0946	0.88	38.5	W11	27	-0.0692	0.17	29.6
G33	3	-0.208	0.047	0.	W14	9	-0.269	0.58	33.3
G34	6	-0.0311	0.17	50.	W15	63	-0.163	0.32	23.8
G35	29	-0.126	0.2	6.9	W16	91	0.0244	0.72	41.8
G36	38	-0.0317	0.06	29.	W19	42	-0.192	0.21	19.1
H1	210	-0.116	0.16	21.	W21	28	-0.528	0.55	7.1
H3	10	-1.93	2.4	0.					

TABLE 5-18
 WQXTSS stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
with 3 or more observations									
C1	3	-27.5	28	0.	H15	131	-0.676	3.7	26.
E1	4	-23.2	7.7	0.	H17	157	-1.02	5.1	39.5
G8	6	-2.75	3.3	16.7	H19	138	0.143	5.1	57.3
G9	3	-3.09	3.3	33.3	H20	16	-2.93	5.7	25.
G14	4	-22.4	32	0.	T5	3	-11.4	8.6	0.
G24	3	-11.4	12	0.	T6	6	-9.72	4.1	0.
G26	6	-25.6	18	0.	T11	7	-5.28	11	14.3
G29	4	-35.3	57	25.	T12	12	-10.8	11	16.7
G33	3	-2.2	3.5	33.3	T13	5	-13.5	14	20.
G34	5	1.07	1.2	80.	W4	4	-12.3	28	25.
G35	6	1.62	4.7	50.	W7	4	-17.9	19	25.
H1	141	-4.2	7	12.1	W9	4	-7.27	16	25.
H7	3	-0.828	1.2	33.3	W10	3	12.2	9	100.
H11	111	-4.66	8.7	15.3	W11	3	-15.7	4.9	0.
H13	133	-3.75	15	12.	W16	3	-0.617	6.8	66.7
H14	14	-3.86	7.7	7.1	W18	4	-4.76	4.9	0.
with less than 3 observations									
C2	2	-11.6	12	0.	G23	1	11.2	0	100.
C5	2	-2.24	1.2	0.	G25	2	-6.32	0.65	0.
D4	1	-0.926	0	0.	G28	2	-4.43	0.95	0.
E2	2	-3.25	4.3	50.	G31	1	-69.9	0	0.
E3	2	-48.5	19	0.	G36	1	-0.777	0	0.
E4	1	0	0	0.	G37	1	-2.53	0	0.
G3	1	2.45	0	100.	H16	1	0.084	0	100.
G4	1	-10.5	0	0.	M3	1	-1.17	0	0.
G5	2	-5.79	11	50.	M4	1	0.178	0	100.
G7	2	-2.95	5	50.	T2	2	-18.9	1.8	0.
G12	1	-32.4	0	0.	T4	1	-15	0	0.
G13	1	-3.24	0	0.	W2	1	63.9	0	100.
G15	2	-5.25	0.26	0.	W5	2	-6.25	3.1	0.
G16	2	-1.99	0.78	0.	W15	1	-0.593	0	0.
G18	1	0.378	0	100.	W17	2	-20.3	2.4	0.
G19	1	-10	0	0.	W19	1	0.546	0	100.

TABLE 5-19

WQVSS stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 1 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	Avg	St dev	percent positive	<u>Seg- ment</u>	<u>No.of obs</u>	Avg	St dev	percent positive
C1	2	-30.9	5.9	0.	H13	130	-0.599	2.2	23.1
C2	1	1.75	0	100.	H14	14	-0.655	0.68	7.1
G16	2	-0.318	0.1	0.	H15	127	-0.0944	1	37.8
G19	1	-2.3	0	0.	H16	1	-0.168	0	0.
G34	2	2.57	2	100.	H17	134	-0.0644	0.93	45.5
H1	136	-0.41	1.1	22.1	H19	136	-0.0443	0.94	54.4
H7	1	0.109	0	100.	H20	16	-0.418	0.89	18.8
H8	1	-0.168	0	0.	T11	1	4.76	0	100.
H11	107	-0.585	1.3	24.3	W18	2	-0.421	0	0.

TABLE 5-20
 WQCHLA stratification (ppb m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 1 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
G16	2	1.37	0.39	100.	H15	29	0.121	1.9	37.9
H1	33	0.0992	2.7	60.6	H16	3	0.5	1.1	33.3
H7	2	1.25	0.16	100.	H17	31	0.1	0.67	32.3
H8	1	1.09	0	100.	H19	36	0.00103	1.1	38.9
H11	28	0.541	1.8	60.7	H20	9	0.116	0.52	22.2
H13	35	-0.22	1.4	34.3	T11	1	-0.952	0	0.
H14	7	0.096	1.1	28.6					

TABLE 5-21
 WQORGN stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
E1	13	-0.0468	0.27	38.5	H7	46	-0.072	0.42	47.8
E2	28	-0.122	1.2	50.	H11	84	-0.0237	0.17	54.8
E3	10	-0.0183	0.27	40.	H13	69	0.0134	0.087	47.8
G1	25	0.206	0.84	48.	H14	58	0.066	0.2	58.6
G4	25	-0.206	1.1	28.	H15	67	0.00533	0.081	56.7
G5	28	0.0915	0.34	50.	H16	30	0.0369	0.062	73.3
G6	26	0.168	0.59	42.3	H17	102	0.00739	0.1	56.9
G7	27	0.151	0.67	37.	H19	98	-0.0157	0.38	62.2
G9	40	0.0123	0.16	52.5	H20	11	-0.103	0.17	36.4
G12	13	-0.0353	0.056	23.1	S1	26	0.0068	0.079	42.3
G14	12	0.00412	0.048	41.7	T2	33	0.253	0.74	60.6
G15	43	0.0333	0.08	60.5	T3	8	0.021	0.11	62.5
G16	27	0.0312	0.034	81.5	T5	32	0.0741	0.88	46.9
G18	26	0.0261	0.044	80.8	T6	33	0.0098	0.71	42.4
G19	12	-0.0086	0.074	41.7	T10	11	-0.0313	0.18	36.4
G20	26	0.0109	0.031	69.2	T11	36	-0.111	1	41.7
G24	44	0.136	0.6	54.6	T12	24	-0.0644	0.32	29.2
G25	18	-0.0754	0.15	27.8	T13	3	0.0432	0.092	66.7
G26	16	-6.2E-6	0.24	56.3	W4	38	0.0684	0.49	39.5
G29	12	-0.0518	0.19	33.3	W6	26	0.0983	0.46	38.5
G30	27	-0.0221	0.22	33.3	W7	11	-0.0786	0.18	36.4
G31	12	0.00739	0.2	41.7	W10	26	-0.0663	1.1	34.6
G32	27	-0.0622	0.38	37.	W11	12	0.0244	0.091	58.3
G36	38	-0.0053	0.05	55.3	W16	86	0.0724	0.35	50.
H1	73	0.0512	0.25	67.1	W19	37	0.00943	0.061	54.1

TABLE 5-22
 WQAMMN stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
E1	14	-0.0273	0.085	0	H1	130	0.0141	0.053	55
E2	26	-0.0064	0.032	0	H7	46	0.0562	0.16	76
E3	13	0.00401	0.014	46	H11	135	0.051	0.13	69
G1	25	-0.222	0.88	20	H13	123	0.0345	0.099	71
G4	24	0.0616	0.17	17	H14	68	0.149	0.26	78
G5	29	0.0865	0.38	21	H15	129	0.0498	0.1	77
G6	26	0.0103	0.12	8	H16	31	0.166	0.15	90
G7	26	-0.0192	0.075	0	H17	164	0.0907	0.25	76
G9	41	0.00391	0.028	5	H19	162	0.0768	0.34	61
G12	16	0.00212	0.0085	38	H20	16	-0.086	0.15	13
G14	14	0.00074	0.0061	36	M3	3	0.00061	0.0009	33
G15	43	0.0732	0.067	77	S1	27	-0.0958	0.23	30
G16	28	0.0267	0.043	61	T2	34	0.0778	0.33	15
G18	27	0.0143	0.035	30	T3	8	-0.0959	0.1	0
G19	13	0	0	0	T5	33	-0.0328	0.17	3
G20	26	-0.0018	0.0073	0	T6	33	0.0187	0.085	9
G24	45	-0.0363	0.11	9	T10	11	-0.0413	0.16	9
G25	18	-0.0042	0.013	33	T11	37	-0.0191	0.085	8
G26	19	-0.0022	0.035	37	T12	24	0.00676	0.057	33
G29	14	-0.0051	0.0098	14	W4	40	-0.0008	0.0064	8
G30	25	0.077	0.39	8	W6	27	-0.015	0.097	4
G31	14	-0.0011	0.019	14	W7	12	-0.0085	0.0043	0
G32	25	0.0935	0.43	8	W10	26	0.00642	0.032	4
G33	3	-0.0036	0.0027	0	W11	15	-0.0018	0.0074	13
G34	4	0.00012	0.004	50	W16	87	0.0115	0.077	11
G35	3	0.00254	0.011	33	W19	38	-0.0043	0.034	13
G36	39	-0.0002	0.002	5					

TABLE 5-23

WQNO3N stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
E1	14	0.013	0.049	7.1	H1	132	0.00593	0.011	79.6
E2	25	-0.0166	0.098	16.	H7	45	0.00201	0.0079	51.1
E3	12	-0.0043	0.011	8.3	H11	133	0.00655	0.031	63.2
G1	23	-0.0128	0.068	8.7	H13	125	0.00491	0.043	58.4
G4	23	-0.0124	0.13	13.	H14	61	0.00008	0.0095	31.2
G5	26	-0.0187	0.045	3.9	H15	131	0.00482	0.015	59.5
G6	23	0.029	0.15	26.1	H16	27	0.00579	0.0093	51.9
G7	23	-0.0348	0.081	4.4	H17	160	0.00994	0.031	61.3
G9	36	0.0114	0.063	11.1	H19	159	0.0182	0.051	52.2
G12	14	0.0024	0.0045	50.	H20	15	-0.402	2	60.
G14	12	0.00088	0.0029	16.7	S1	23	0.00126	0.02	26.1
G15	41	-0.0009	0.0086	24.4	T2	33	0.0198	0.14	21.2
G16	26	0.00233	0.013	46.2	T3	8	-0.0209	0.098	37.5
G18	25	0.0188	0.1	44.	T5	30	0.00699	0.087	23.3
G19	12	0.0798	0.27	25.	T6	30	0.0335	0.28	23.3
G20	24	-0.0011	0.012	29.2	T10	11	0.00826	0.026	9.1
G24	42	0.027	0.14	26.2	T11	35	-0.0113	0.057	8.6
G25	17	8.2E-6	0.012	29.4	T12	22	0.133	0.33	31.8
G26	17	0.0195	0.056	23.5	T13	3	-0.0067	0.02	33.3
G29	12	0.00009	0.0025	8.3	W4	36	-0.0085	0.16	16.7
G30	23	-0.0046	0.068	17.4	W6	23	-0.001	0.018	4.4
G31	12	-0.0020	0.0043	8.3	W7	11	0.00248	0.0072	27.3
G32	23	-0.0254	0.12	8.7	W10	23	-0.0402	0.17	13.
G34	5	-0.0006	0.0009	0.	W11	13	0.00145	0.0041	38.5
G35	3	-0.0080	0.0044	0.	W16	81	0.0172	0.11	14.8
G36	36	0.00012	0.013	19.4	W19	35	0.00384	0.012	20.

TABLE 5-24
 WQTOC stratification (ppm m⁻¹)
 Period of Record Statistics for Hydrographic Segments
 with 3 or more observations

<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>	<u>Seg- ment</u>	<u>No.of obs</u>	<u>Avg</u>	<u>St dev</u>	<u>percent positive</u>
E1	3	0.637	1.1	66.7	H14	6	-0.0256	0.18	33.3
E3	11	-0.455	1.8	36.4	H15	106	0.142	0.29	68.9
G5	3	0.375	0.18	100.	H17	109	0.547	1.1	86.2
G9	14	-0.0087	0.22	64.3	H19	111	0.18	0.44	68.5
G12	14	0.0205	0.24	50.	H20	13	-0.111	0.49	30.8
G14	12	0.0899	0.14	83.3	T2	8	-0.363	1	25.
G15	3	-0.113	0.39	33.3	T3	7	-0.178	1.6	57.1
G24	20	-0.0974	1.2	50.	T5	6	-0.279	0.49	50.
G25	16	-0.397	0.86	37.5	T6	8	-0.653	1.6	50.
G26	17	0.407	3.2	41.2	T11	10	-0.351	1.4	50.
G29	12	0.282	1.3	58.3	T12	10	0.0301	0.83	50.
G31	10	-0.839	1.6	40.	T13	3	0.439	0.59	66.7
H1	110	0.105	0.34	65.5	W4	11	-0.345	0.93	54.6
H7	16	0.0768	0.43	56.3	W7	11	-0.187	1	45.5
H11	92	0.107	0.25	64.1	W11	13	-0.152	0.59	30.8
H13	102	0.147	0.22	66.7	W16	12	-0.0878	0.27	33.3

TABLE 5-25

Correlation array of conventional water quality parameters
based on average (non-BDL) segment concentrations (all data)

	WQSAL	WQDO	WQDODEF	WQPH	WQXTSS	WQAMMN	WQORGN	WQKJLN	WQNO3N
WQTEMP	0.029	-0.48	0.095	-0.238	0.252	-0.088	-0.269	0.004	-0.15
WQSAL		-0.248	0.131	-0.411	0.094	-0.026	0.023	-0.113	-0.044
WQDO			-0.318	0.598	-0.208	0.158	0.311	0.14	0.023
WQDODEF				-0.224	-0.161	-0.046	0.059	0.172	0.089
WQPH					0.011	0.026	0.088	0.096	0.134
WQXTSS						-0.186	-0.065	0.024	-0.142
WQAMMN							0.119	0.053	0.121
WQORGN								0.416	0.146
WQKJLN									0.011

	WQTOTP	WQVOLS	WQVSS	WQO&G	WQTOC	WQXBOD5	WQCHLA	WQTCOLI	WQFCOLI
WQTEMP	-0.019	-0.521	0.001	0.159	-0.127	0.455	0.134	-0.015	0.13
WQSAL	-0.01	-0.172	0.292	0.108	-0.202	0.269	0.118	0.07	0.005
WQDO	0.038	0.349	-0.215	-0.407	0.346	-0.397	-0.036	-0.007	-0.056
WQDODEF	-0.191	-0.174	0.139	0.169	-0.099	-0.079	0.21	-0.014	0.217
WQPH	0.091	0.236	-0.278	-0.32	0.305	-0.357	-0.087	-0.065	0.046
WQXTSS	0.01	-0.132	-0.313	-0.127	-0.022	0.253	-0.023	-0.097	0.032
WQAMMN	0.122	0.136	0.054	-0.182	0.075	0.039	0.03	0.02	-0.162
WQORGN	-0.307	0.313	-0.11	-0.007	0.283	-0.426	-0.003	0.047	-0.054
WQKJLN	-0.247	-0.093	-0.272	0.071	0.103	-0.285	0.034	-0.096	-0.035
WQNO3N	-0.156	0.317	0.032	-0.2	0.059	-0.341	-0.069	0.156	0.052
WQTOTP		-0.052	0.204	-0.166	-0.325	0.382	0.223	-0.1	-0.099
WQVOLS			-0.062	-0.16	0.338	-0.469	-0.397	-0.087	-0.027
WQVSS				0.067	-0.209	0.175	0.119	0.134	0.195
WQO&G					-0.251	0.203	-0.065	0.162	0.04
WQTOC						-0.392	-0.222	-0.12	0.132
WQXBOD5							0.165	0.	-0.15
WQCHLA								0.03	-0.042
WQTCOLI									0.021

TABLE 5-26

Correlation array of conventional water-quality parameters
based on average (non-BDL) segment concentrations, surface values (s) and geometric means (*)

TABLE 5-27

Correlation array of metal-related water quality parameters
based on average (non-BDL) segment concentrations

	WQMETBAT	WQMETHGT	WQMETNIT	WQMETSET	WQMETCDT	WQMETCRT	WQMETCUT	WQMETFET	WQMETPBT
WQMETAST	0.37	†			-0.01	0.10	0.22	0.47	-0.26
WQMETBAT		†			0.36	0.06	0.00	0.08	-0.16
WQMETHGT				†		†	†	†	†
WQMETCDT						-0.29	0.01	0.43	-0.14
WQMETCRT							0.01	-0.19	0.06
WQMETCUT								0.13	-0.31
WQMETFET									-0.43
	WQMETBAT	WQMETHGT	WQMETNIT	WQMETSET	WQMETCDT	WQMETCRT	WQMETCUT	WQMETFET	WQMETPBT
WQMETAST	-0.18	-0.18	0.06	0.37		0.30	0.22	0.19	-0.07
WQMETBAT	-0.40		-0.17	-0.30		0.58	0.34	-0.23	-0.03
WQMETHGT	†		†	†		†	†	†	†
WQMETCDT	-0.04		-0.14	0.12		0.56	0.24	0.09	-0.22
WQMETCRT	0.13		0.04	-0.23		-0.19	-0.33	-0.16	0.02
WQMETCUT	-0.08		-0.03	0.31		0.35	-0.08	0.15	-0.15
WQMETFET	0.09		-0.05	0.28		0.11	0.18	-0.01	0.09
WQMETPBT	0.12		-0.07	-0.37		-0.37	-0.23	-0.05	-0.02
WQMETMNT	-0.10		0.01	0.01		0.40	0.15	0.12	-0.21
WQMETHGT			-0.02	0.32		-0.30	0.08	-0.16	-0.06
WQMETNIT						-0.06	-0.02	-0.03	-0.13
WQMETSET						-0.01	0.33	0.32	0.25
WQMETAGT							-0.08	0.20	0.13
WQMETZNT								0.01	-0.11
WQXTSS									0.16

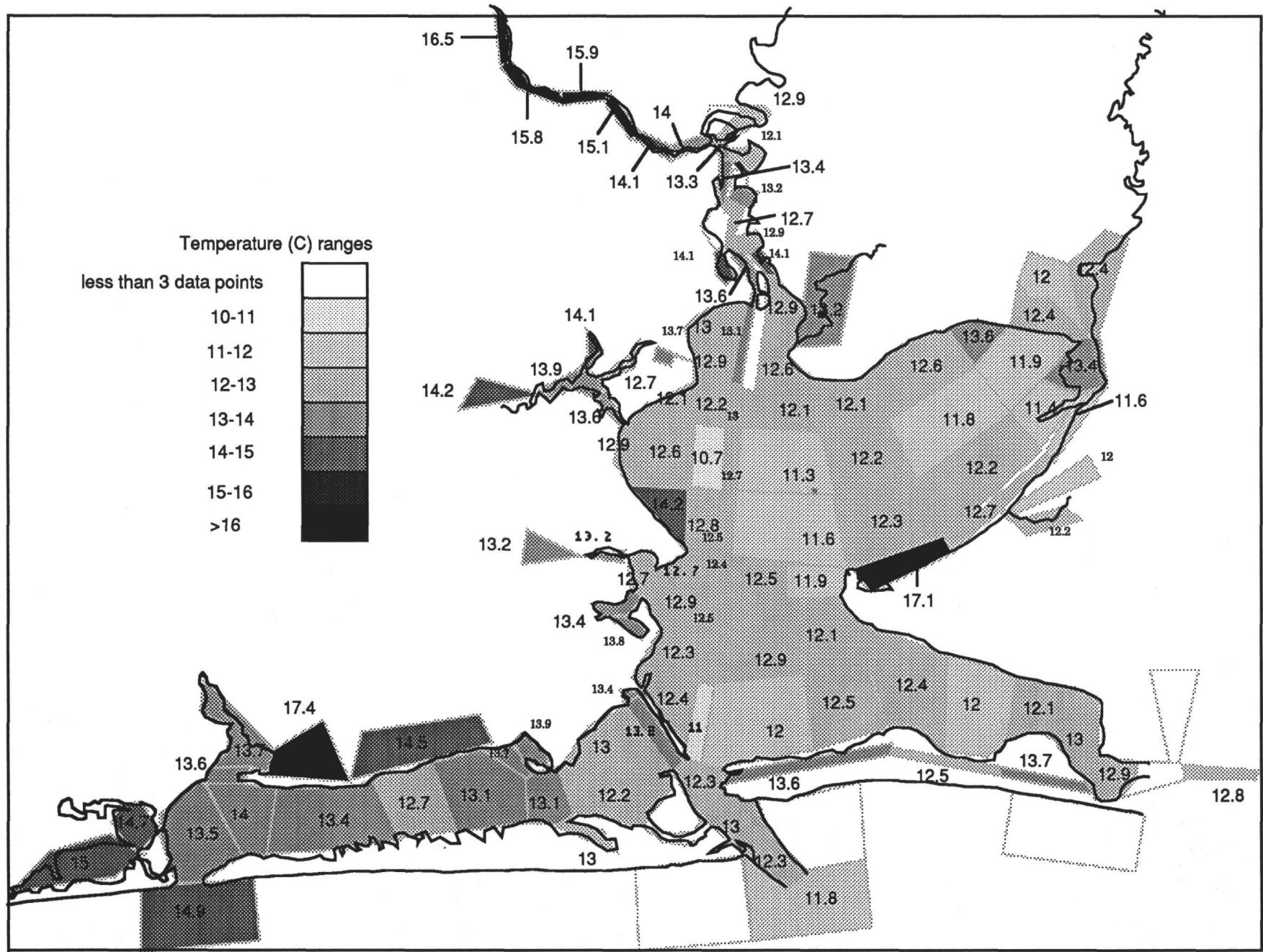
TABLE 5-28

Correlation array of organic parameters
based on average (non-BDL) segment concentrations

	WQ-XDDT	WQ-ALDR	WQ-DIEL	WQ-HEPT	WQ-PCB	WQ-DIAZ	WQ-PAH	WQ-NAPT	WQ-ACEN
WQ-LIND	†	†	†	†	†	†	†	†	†
WQ-XDDT		-0.84	†	*	*	0.70	*	†	†
WQ-ALDR			†	†	0.98	*	*	†	†
WQ-DIEL				†	*	†	†	†	†
WQ-HEPT					†	†	*	†	†
WQ-PCB						*	-0.62	†	†
WQ-DIAZ							†	†	†
WQ-PAH								†	†
WQ-NAPT									†
	WQ-BNZA	WQXTSS	WQSALs	WQVSS	WQTOC	WQTOTP	WQKJLN	WQNO3N	
WQ-LIND	†	*	*	*	*	*	*	*	*
WQ-XDDT	†	0.13	0.15	-0.69	-0.53	0.89	0.08	-0.12	
WQ-ALDR	†	-0.28	-0.06	0.54	0.68	-0.04	-0.84	0.16	
WQ-DIEL	†	-0.17	0.15	-0.78	0.12	0.26	0.35	0.04	
WQ-HEPT	†	0.99	0.65	-0.13	-0.64	-0.98	0.55	0.84	
WQ-PCB	-0.26	0.09	-0.44	-0.29	-0.73	0.61	0.02	-0.30	
WQ-DIAZ	†	0.95	0.48	-0.79	0.86	0.96	-0.04	-0.87	
WQ-PAH	-0.40	-0.49	-0.29	-0.04	0.30	-0.14	-0.04	0.62	
WQ-NAPT	†	†	†	†	†	†	†	†	
WQ-ACEN	†	†	†	†	†	†	†	†	
WQ-BNZA		0.20	0.66	0.17	-0.21	0.07	0.34	-0.13	

† - no data

* - inadequate data for correlation ($r=\pm 1$)



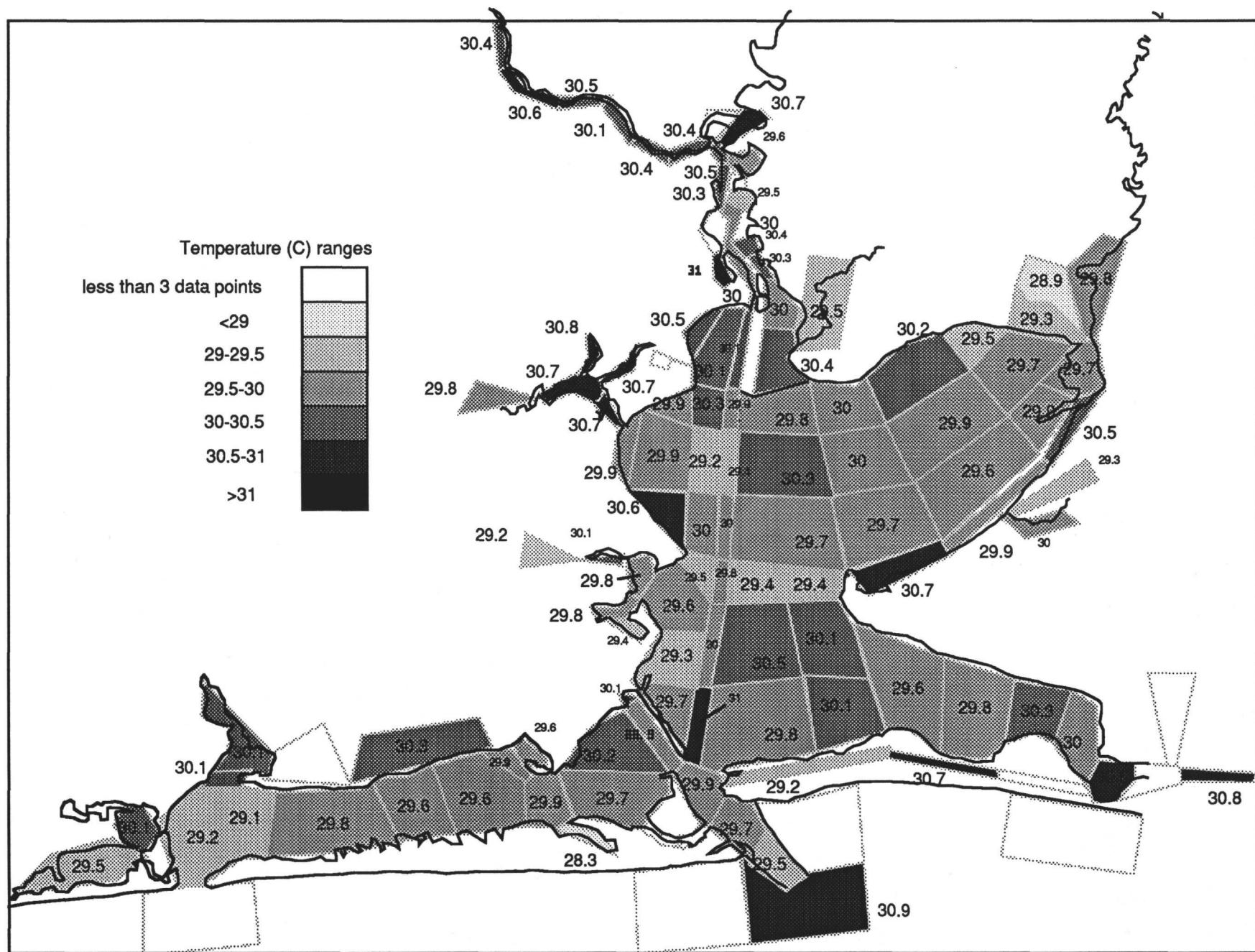


Fig. 5-2 Average (with BDL = 0) concentrations of summer (July-August) temperature (WQTEMP) in upper 0.5 m

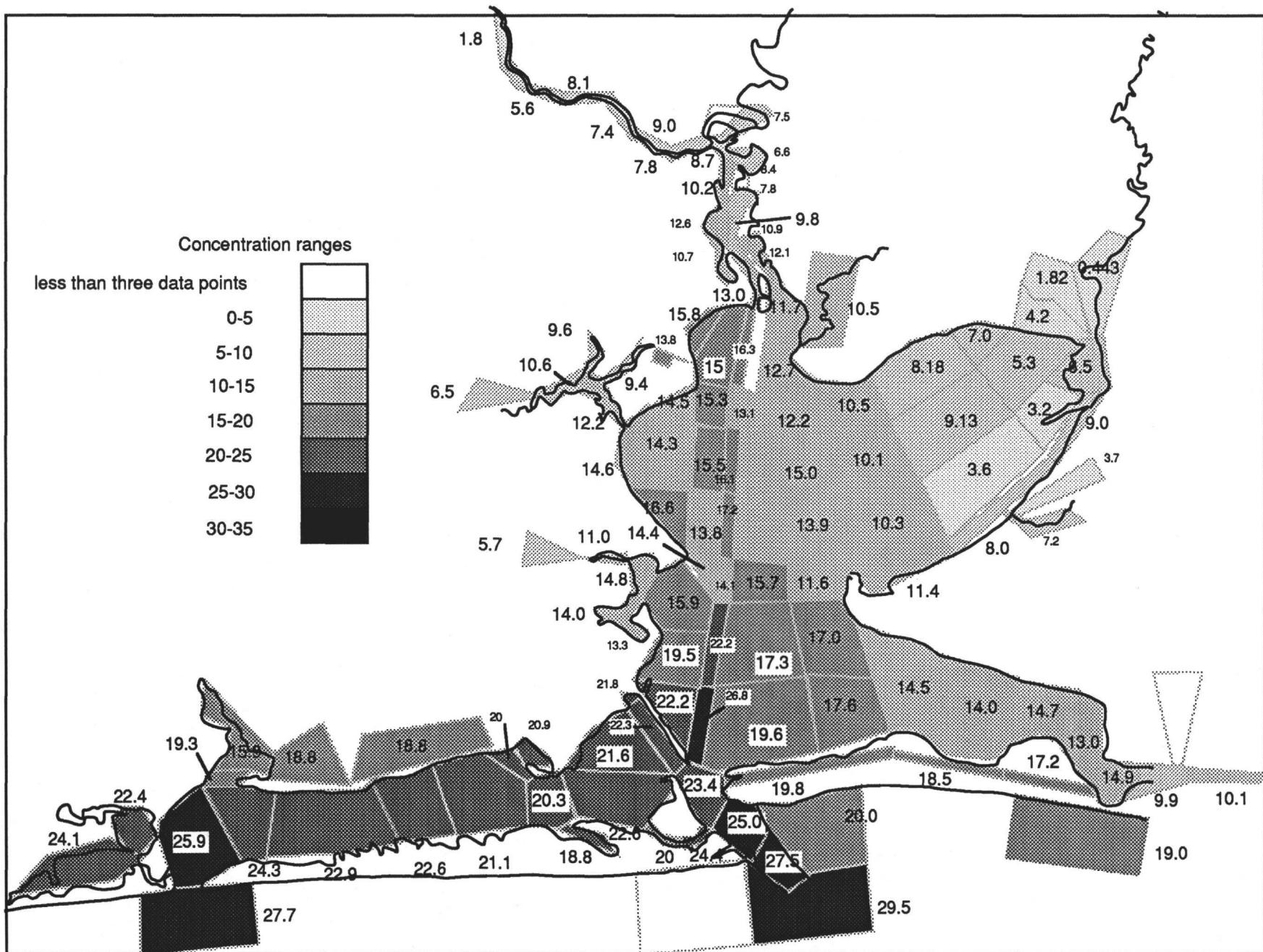


Fig. 5-3 Average salinity (WQSAL) in upper 1.5 m of Galveston Bay

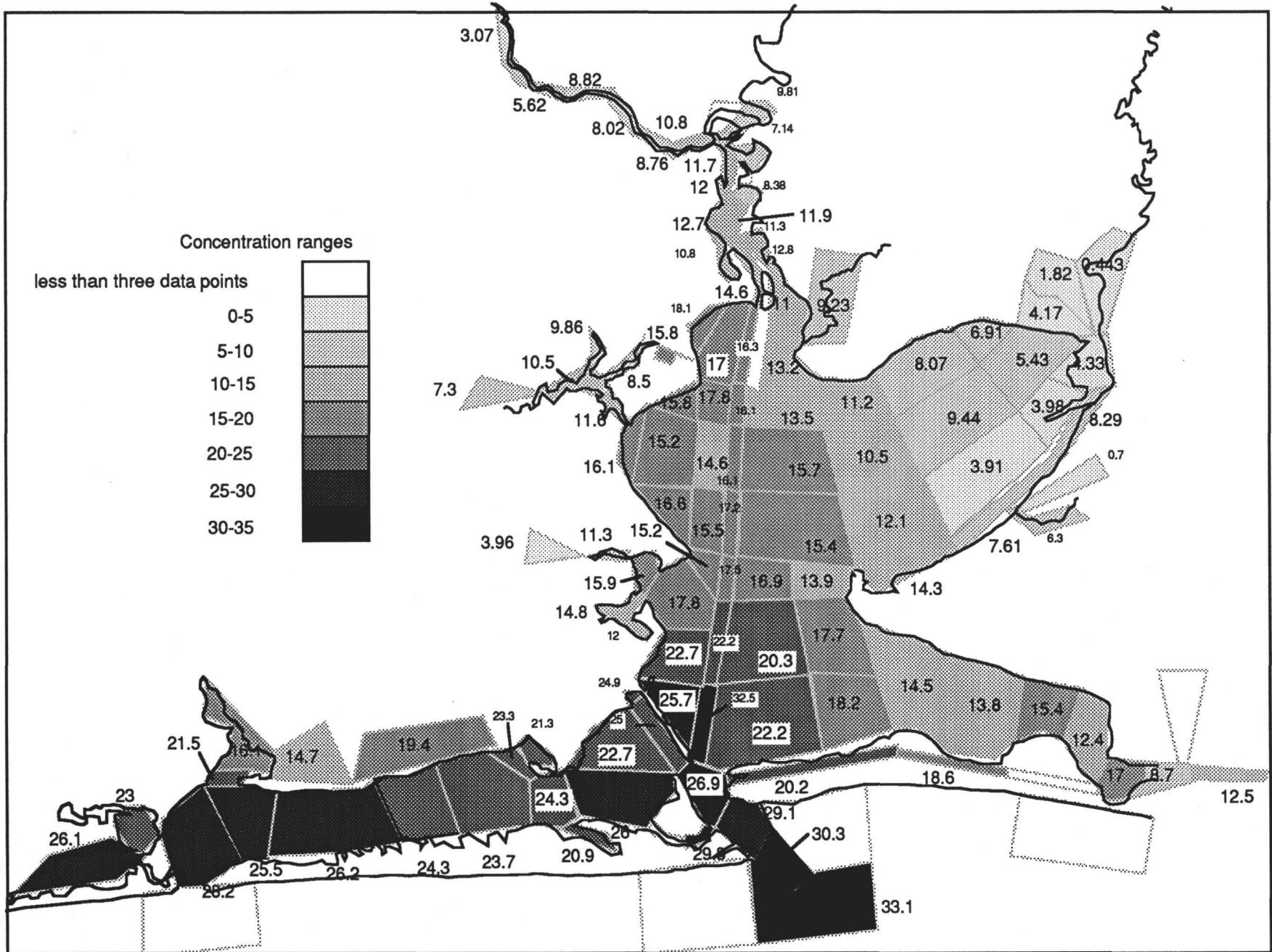


Fig. 5-4 Average (with BDL = 0) concentrations of average summer (JAS) salinity (WQSAL) in upper 1.5 m

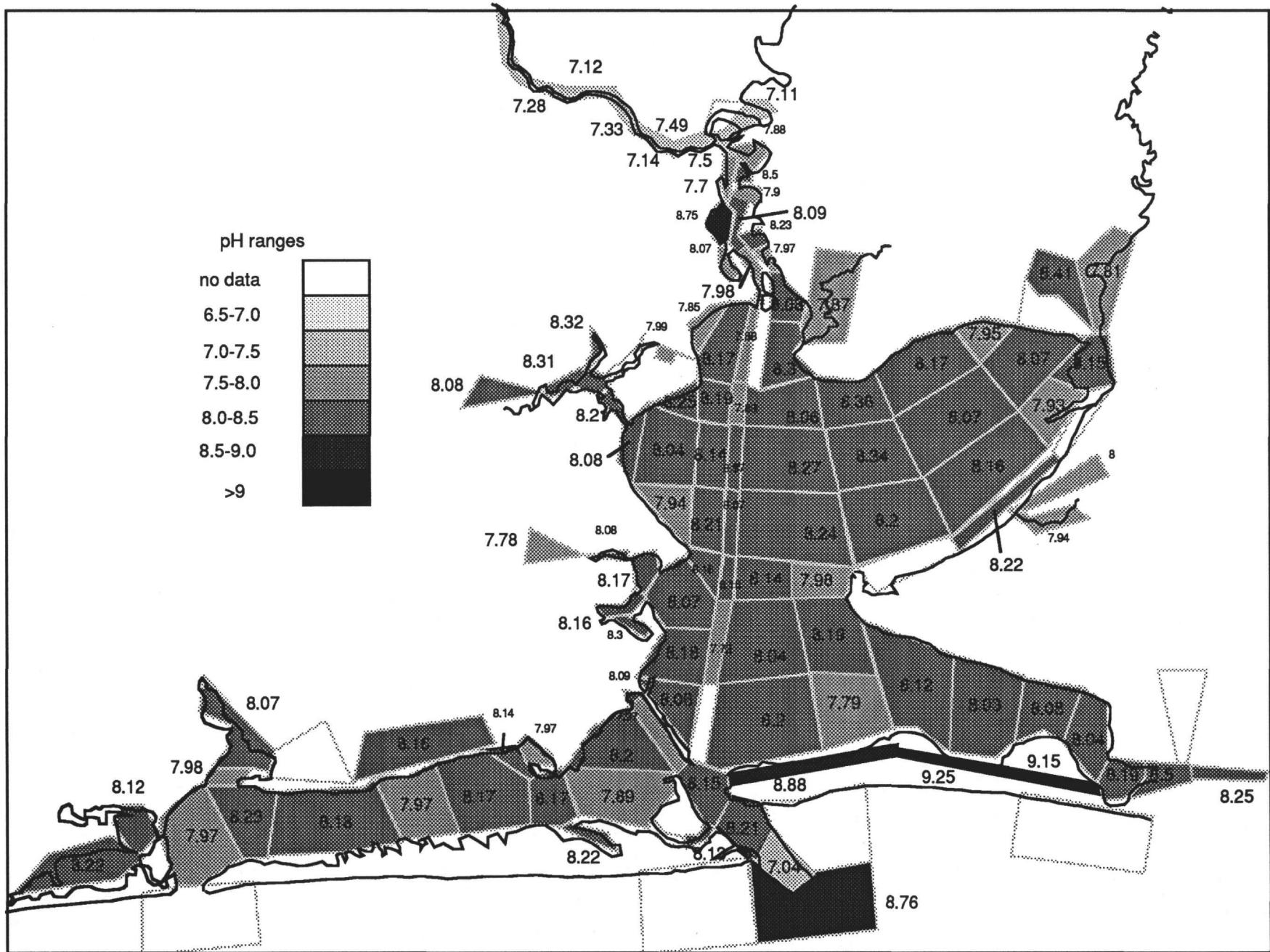


Fig. 5-5 Average pH (WQPH) measurements in Galveston Bay

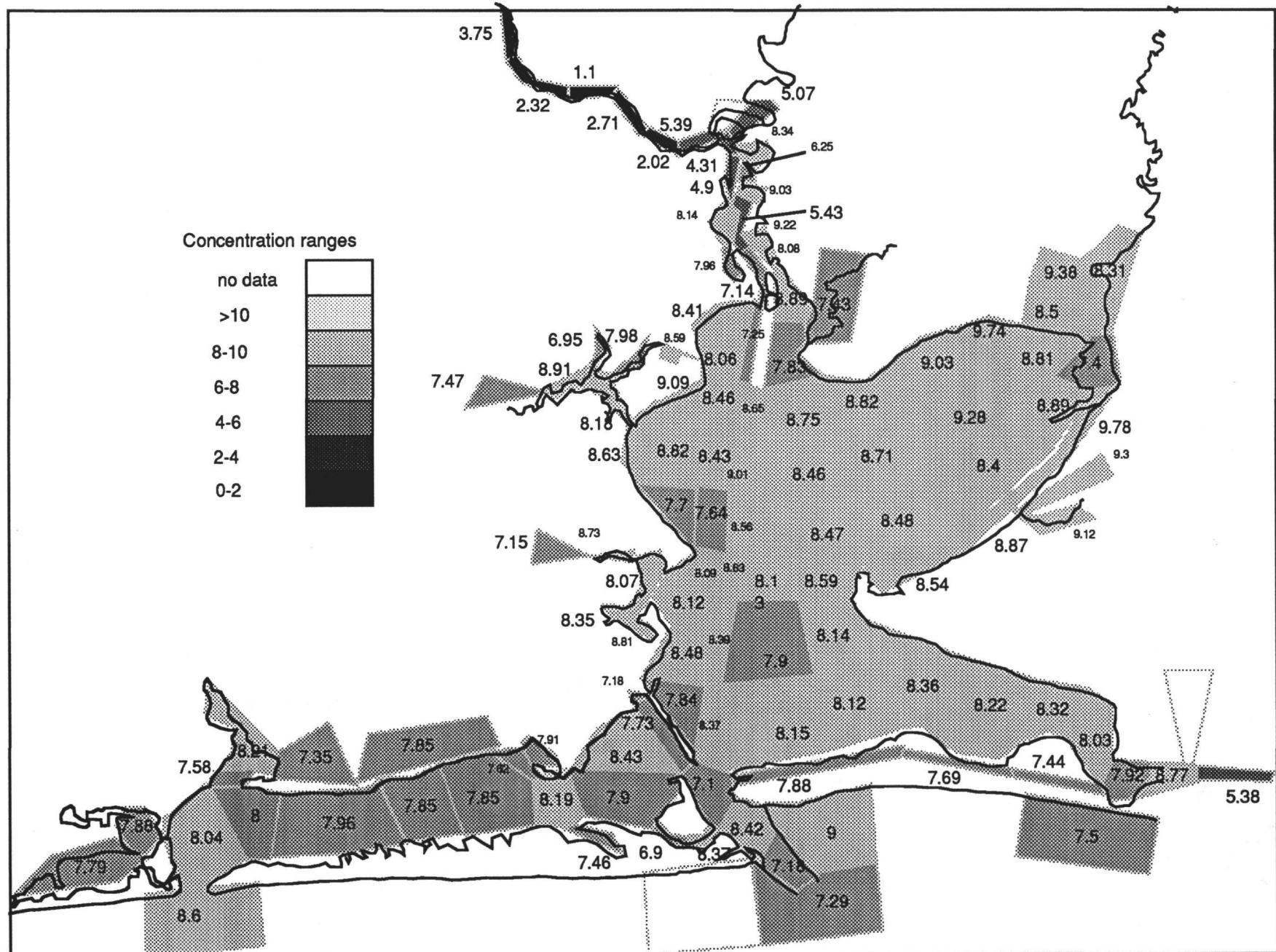


Fig. 5-6 Average concentrations of WQDO in upper 0.5 m in Galveston Bay

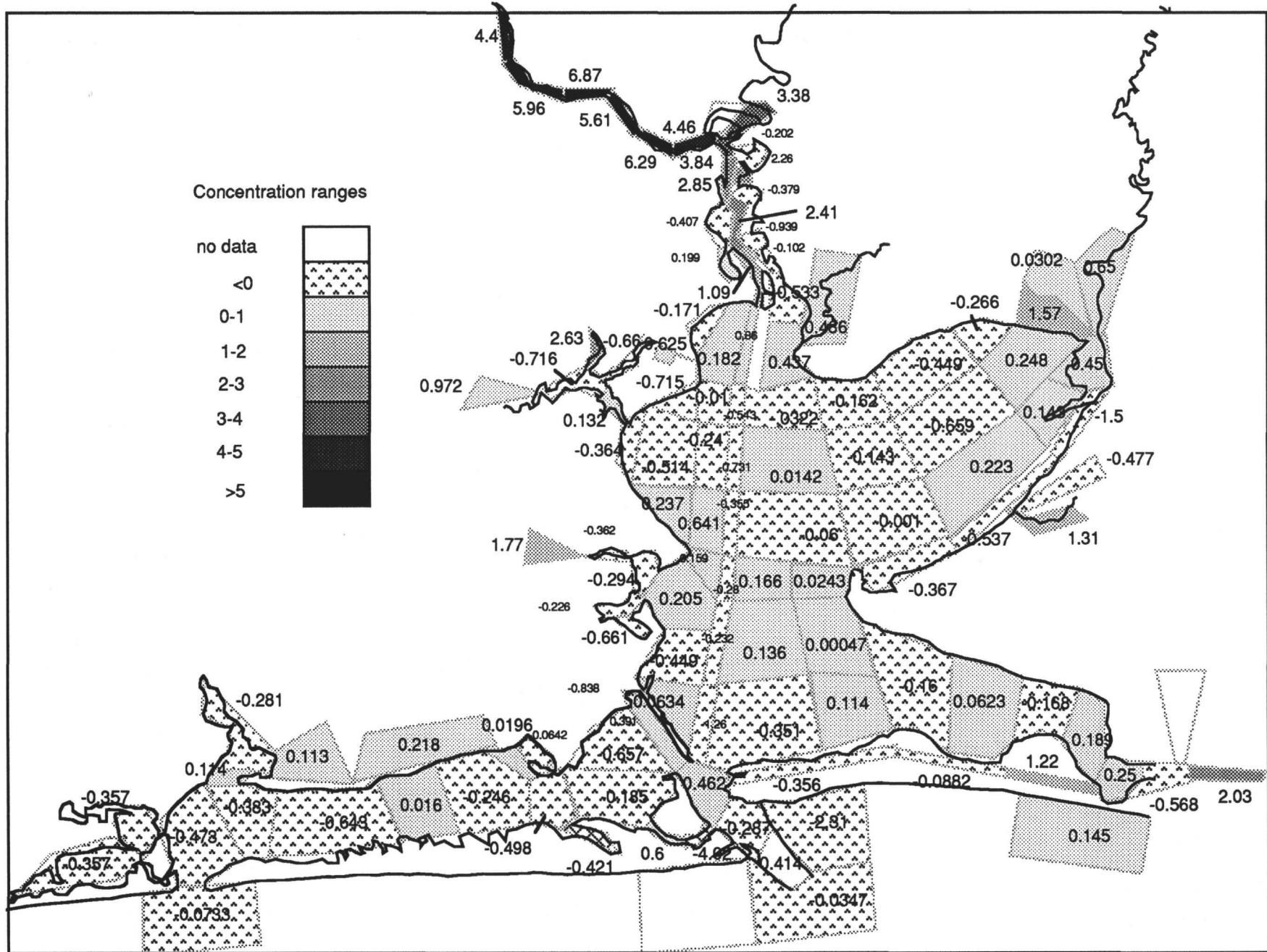


Fig. 5-7 Average concentrations of WQDODEF within upper 0.5 m in Galveston Bay

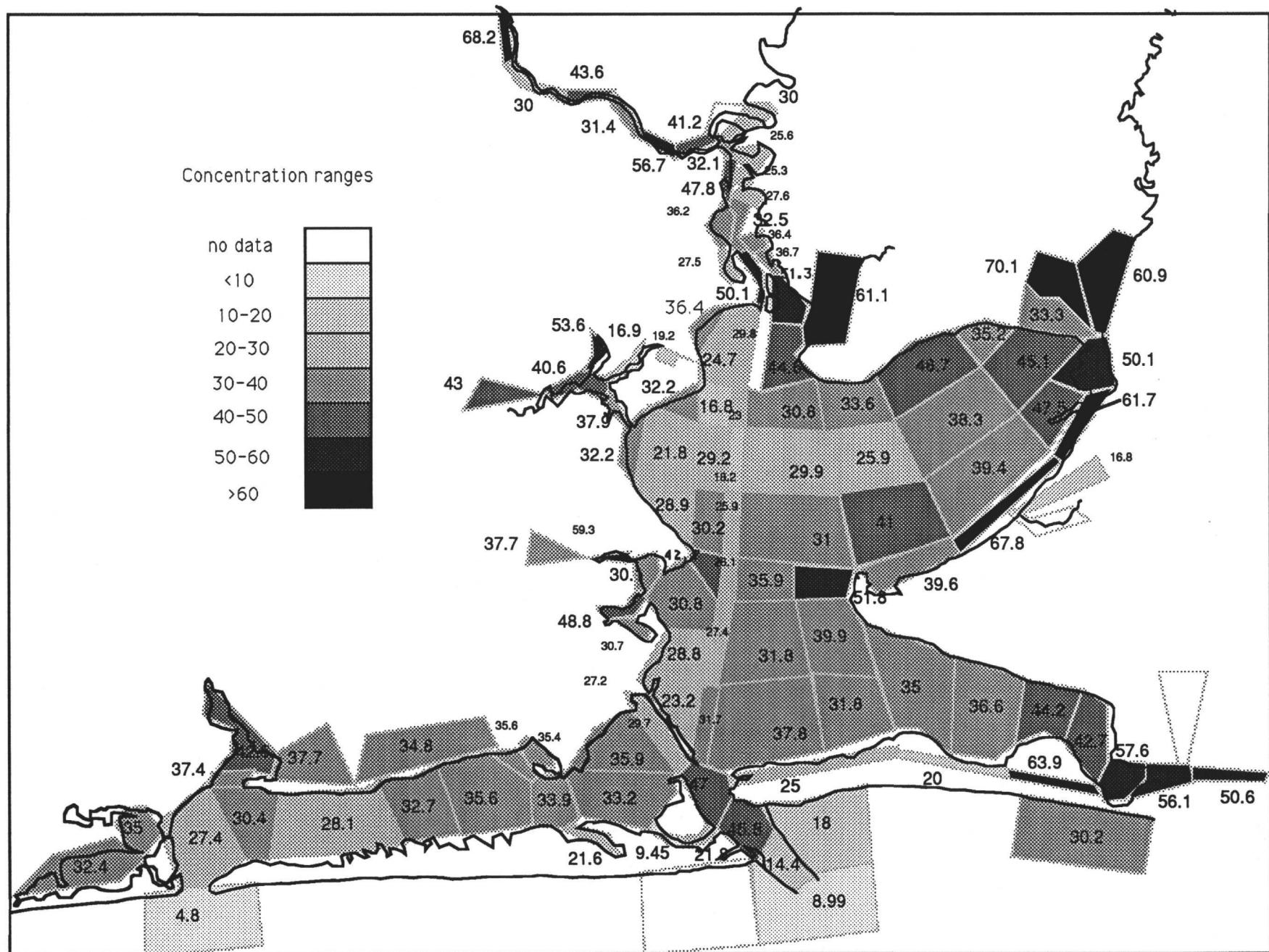


Fig. 5-8 Average (with BDL = 0) concentrations of WQXTSS in Galveston Bay

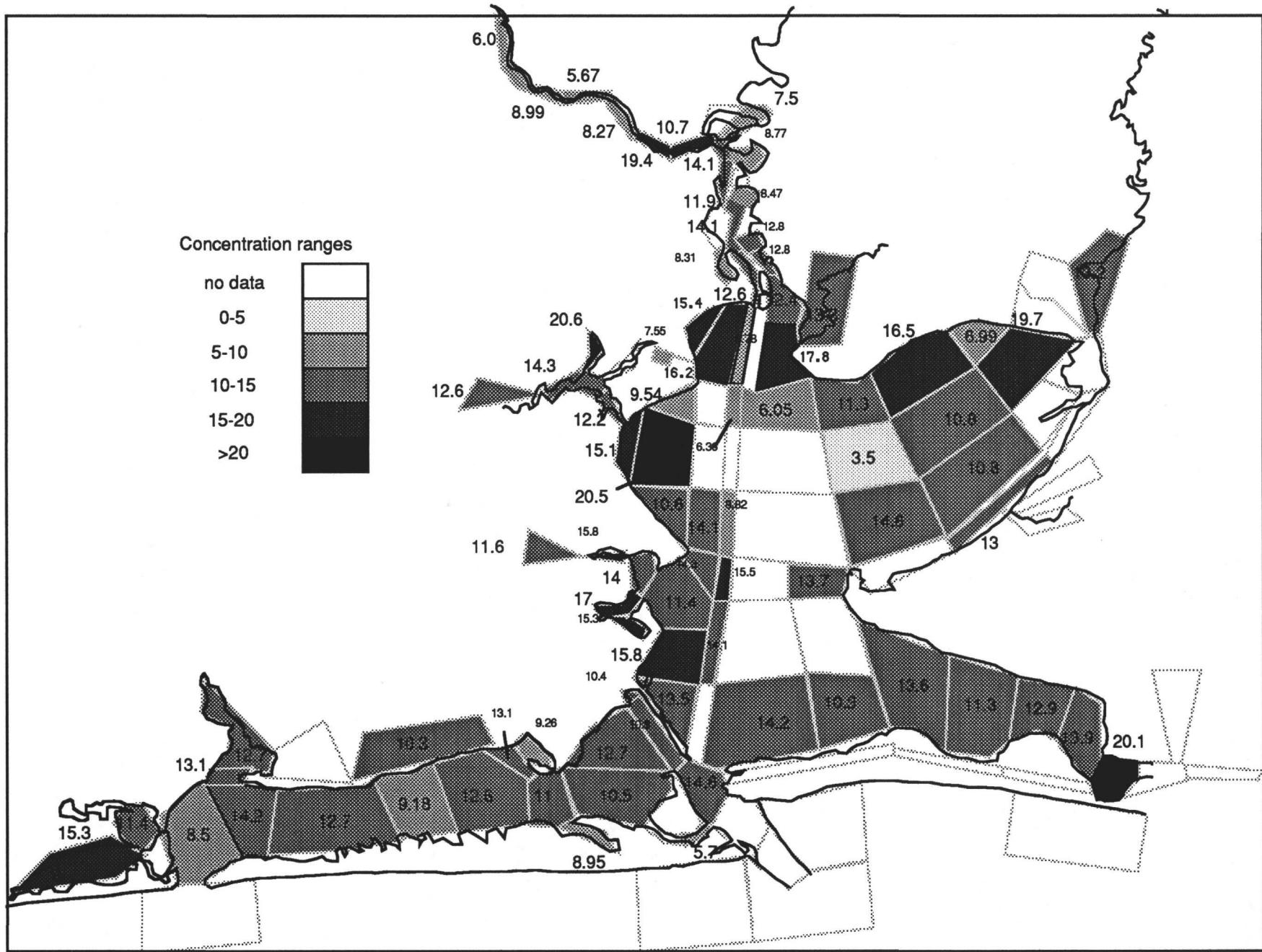


Fig. 5-9 Average (with BDL = 0) concentrations of WQVSS in Galveston Bay

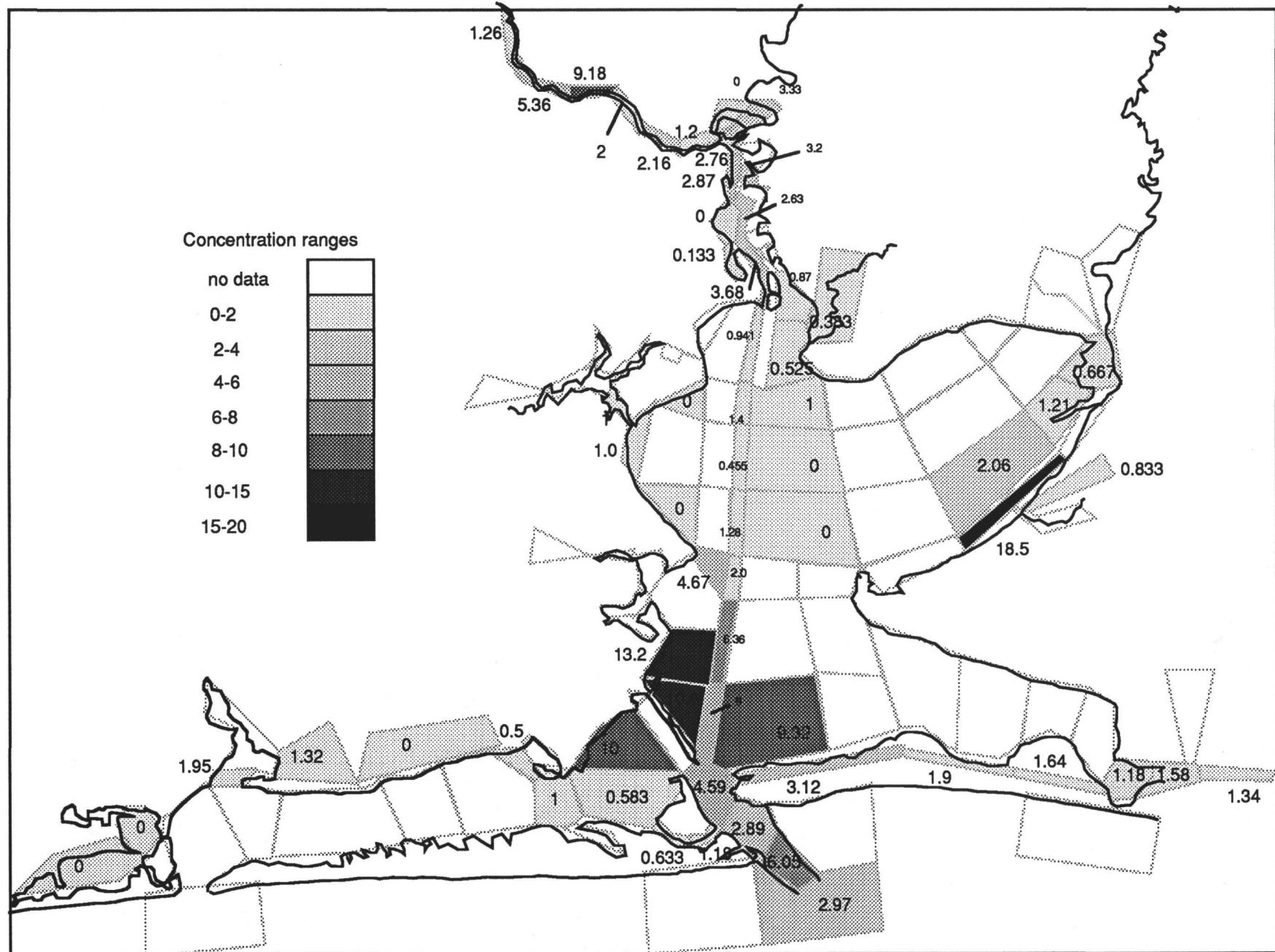


Fig. 5-10 Average (with BDL = 0) concentrations of WQO&G in Galveston Bay

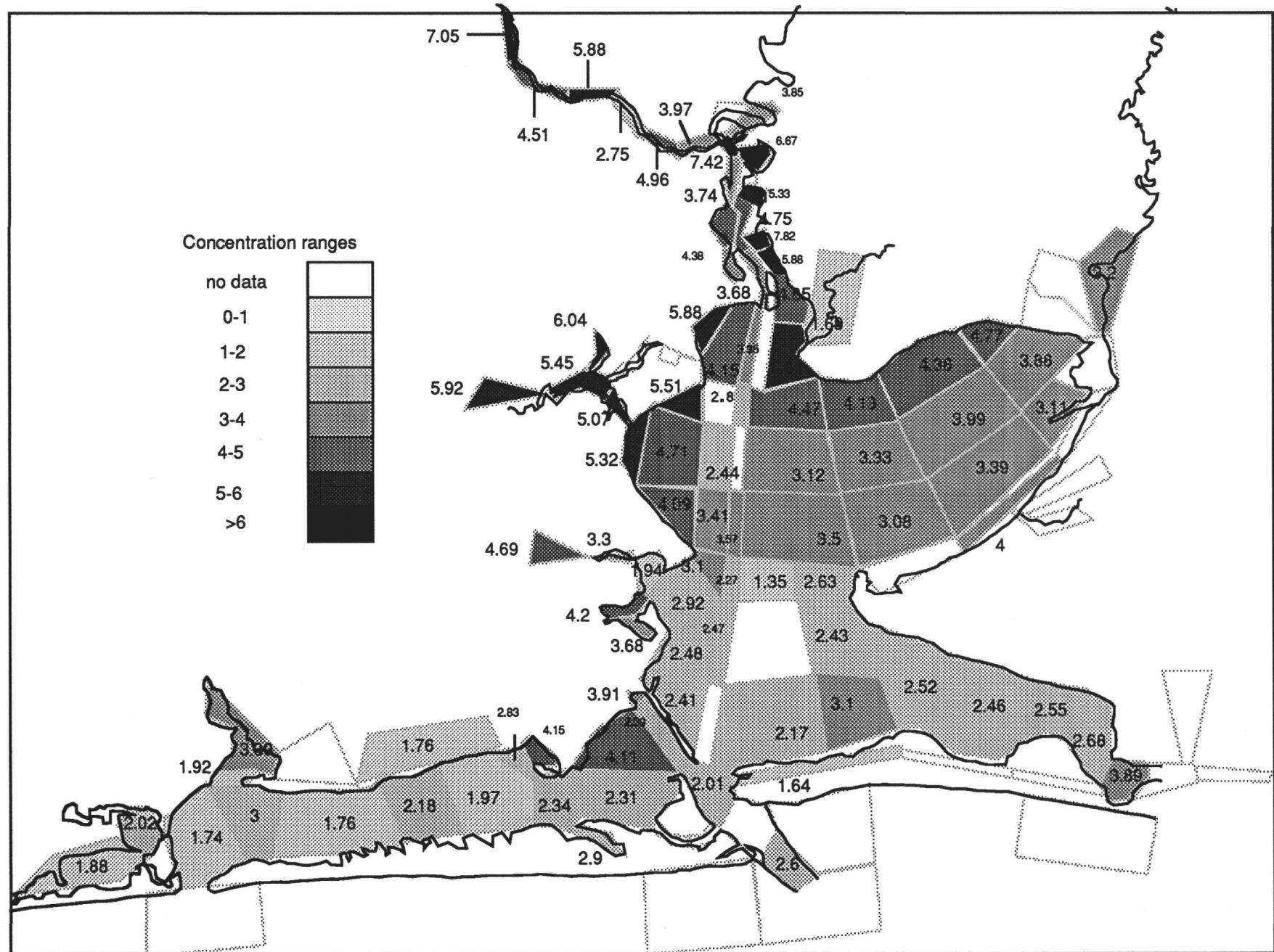


Fig. 5-11 Average (with BDL = 0) concentrations of WQXBOD5 in Galveston Bay

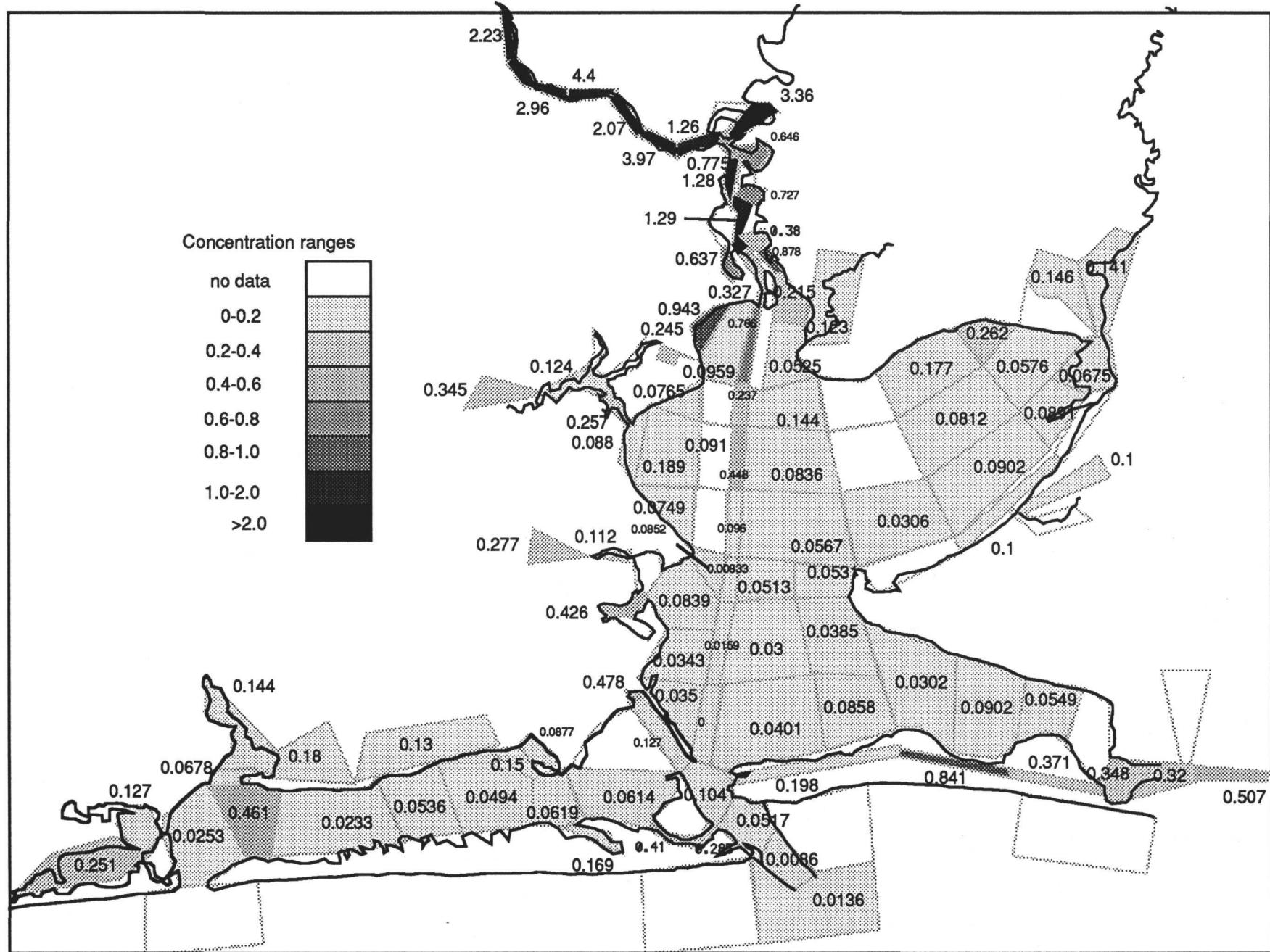


Fig. 5-12 Average (with BDL = 0) concentrations of WQAMMN in Galveston Bay

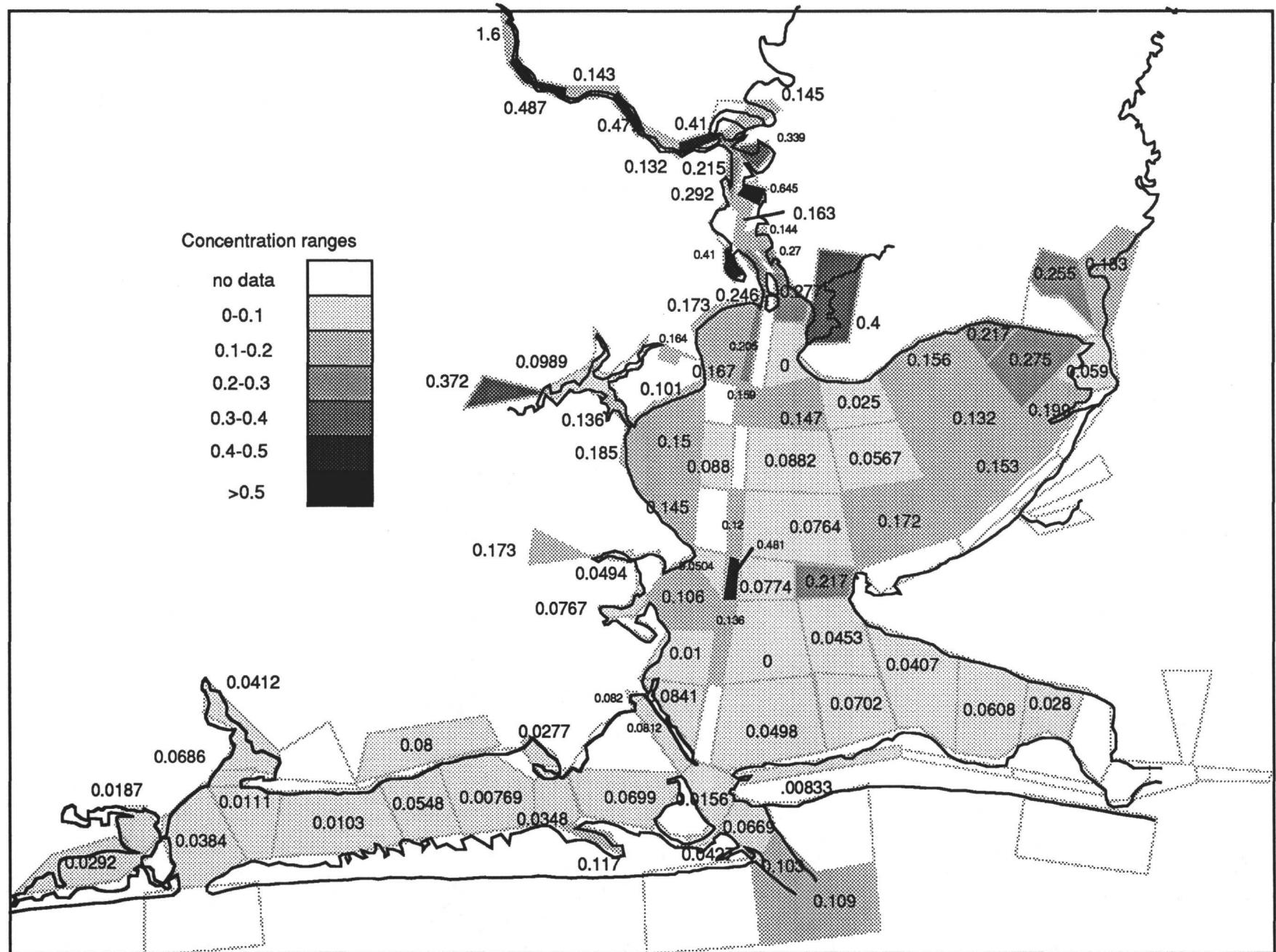


Fig. 5-13 Average (with BDL = 0) concentrations of WQNO3N in Galveston Bay

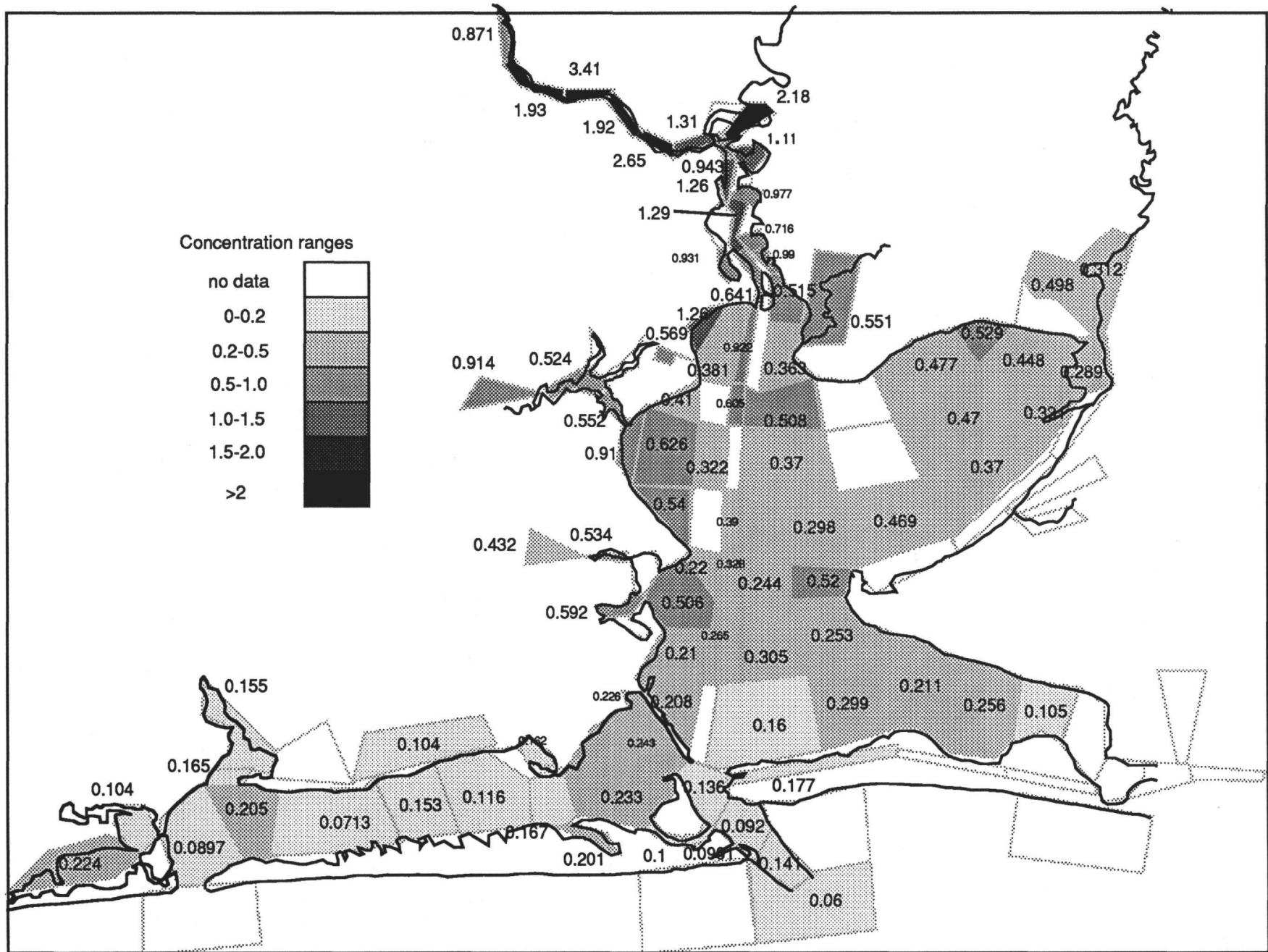


Fig. 5-14 Average (with BDL = 0) concentrations of WQTOTP in Galveston Bay

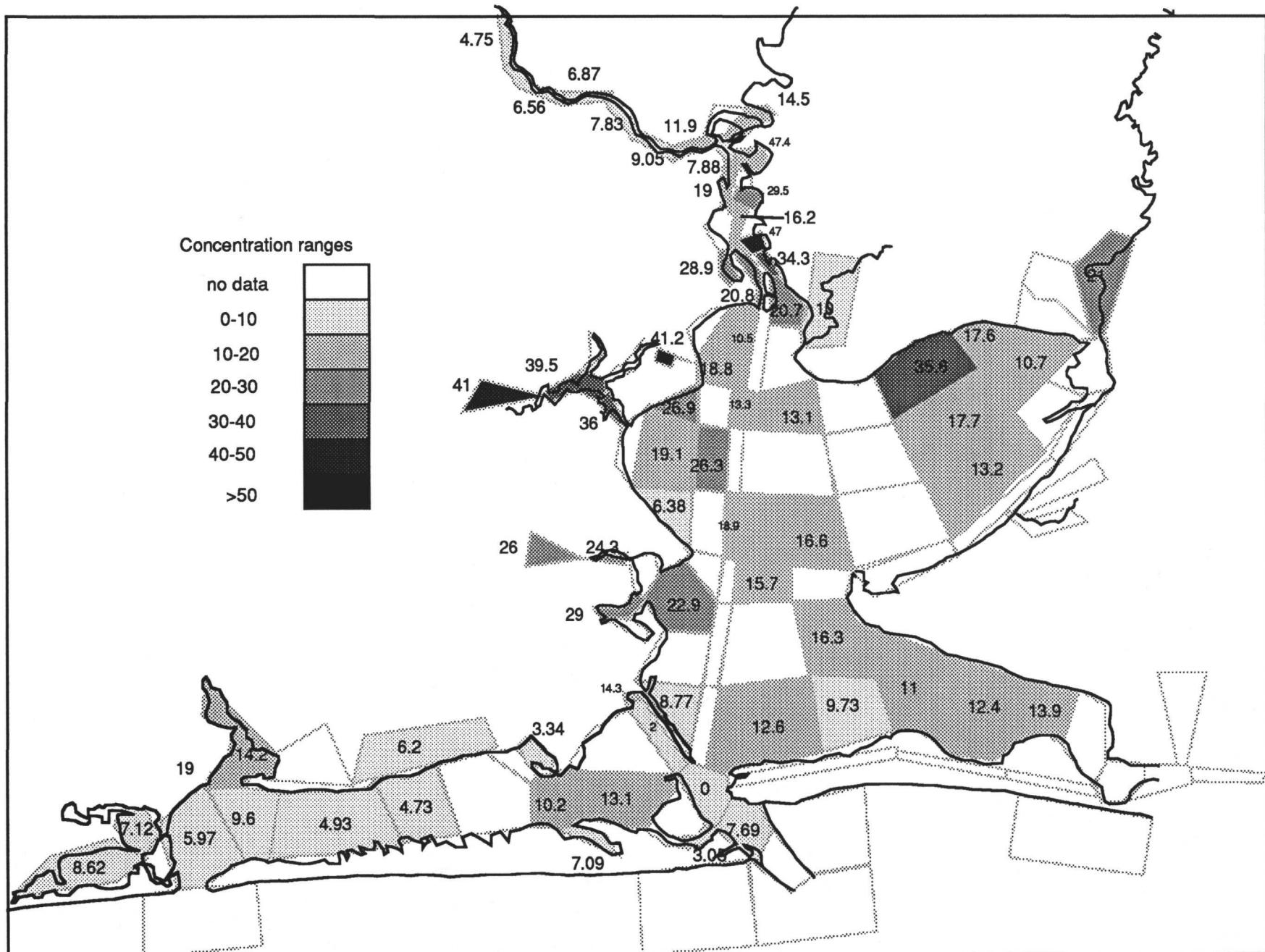


Fig. 5-15 Average (with BDL = 0) concentrations of WQCHLA in Galveston Bay

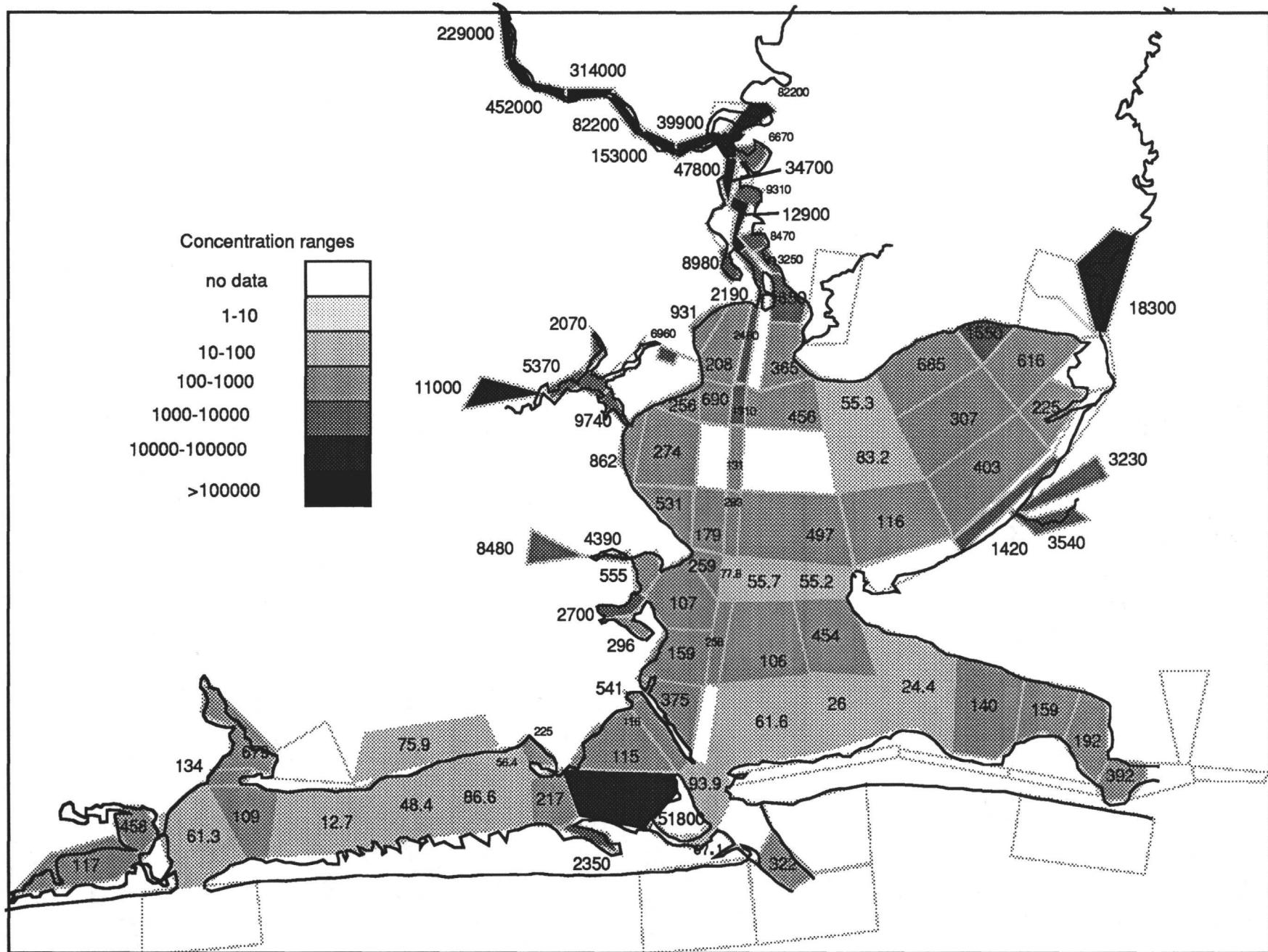


Fig. 5-16 Average (with BDL = 0) concentrations of WQTCOLI in Galveston Bay

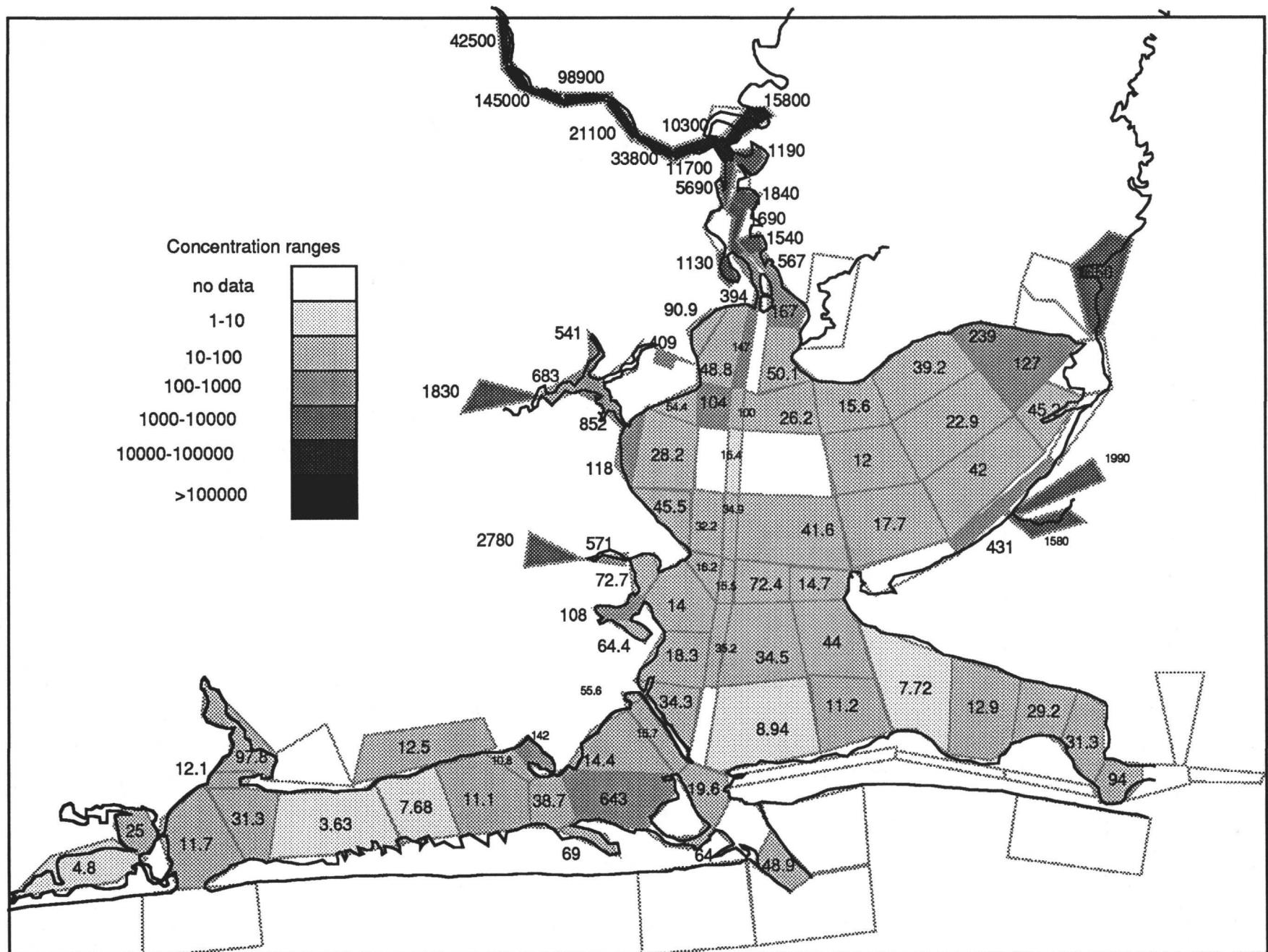


Fig. 5-17 Geometric average concentrations of WQTCOLI in Galveston Bay

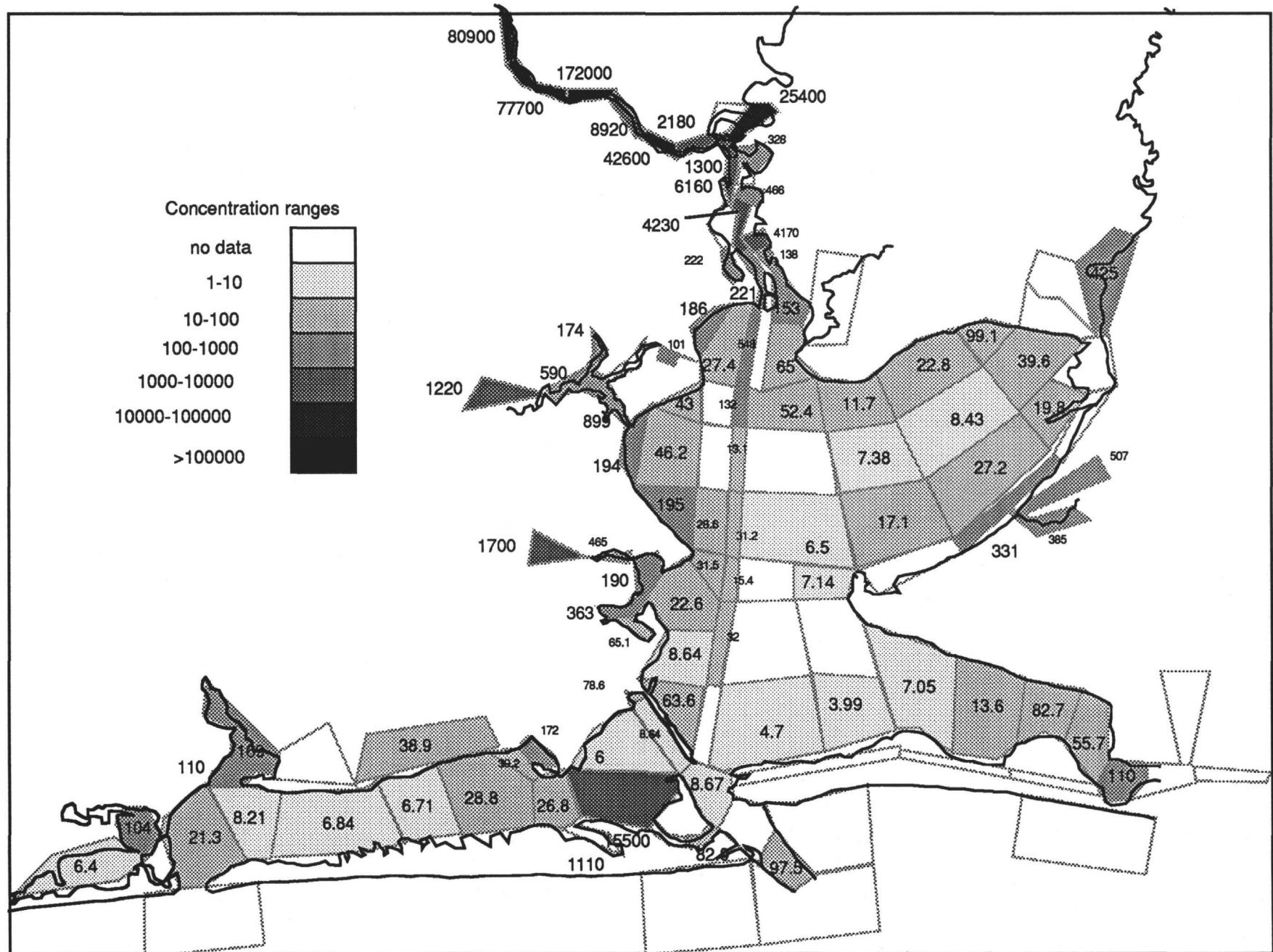


Fig. 5-18 Average (with BDL = 0) concentrations of WQFCOLI in Galveston Bay

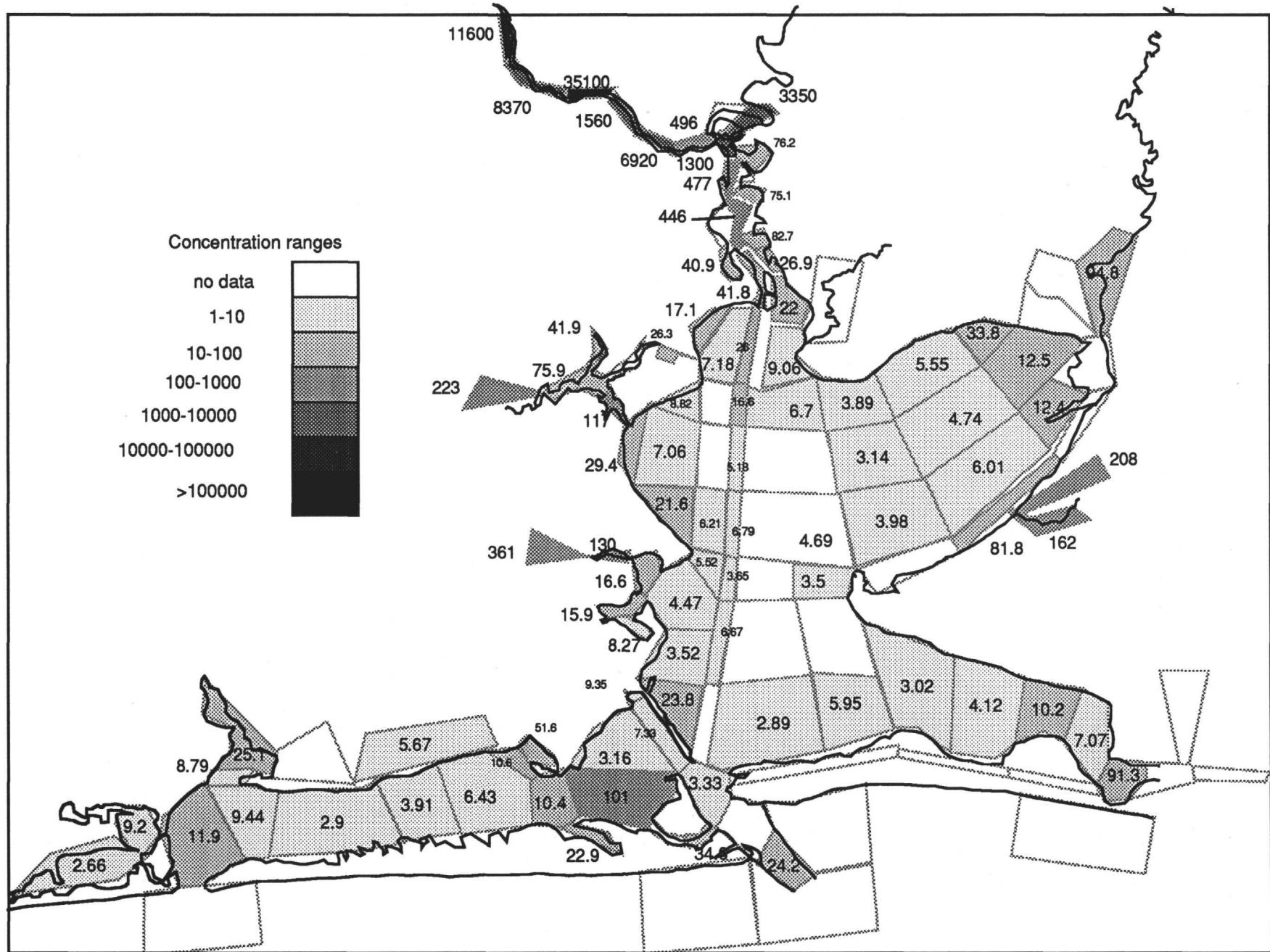


Fig. 5-19 Geometric average concentrations of WQFCOLI in Galveston Bay

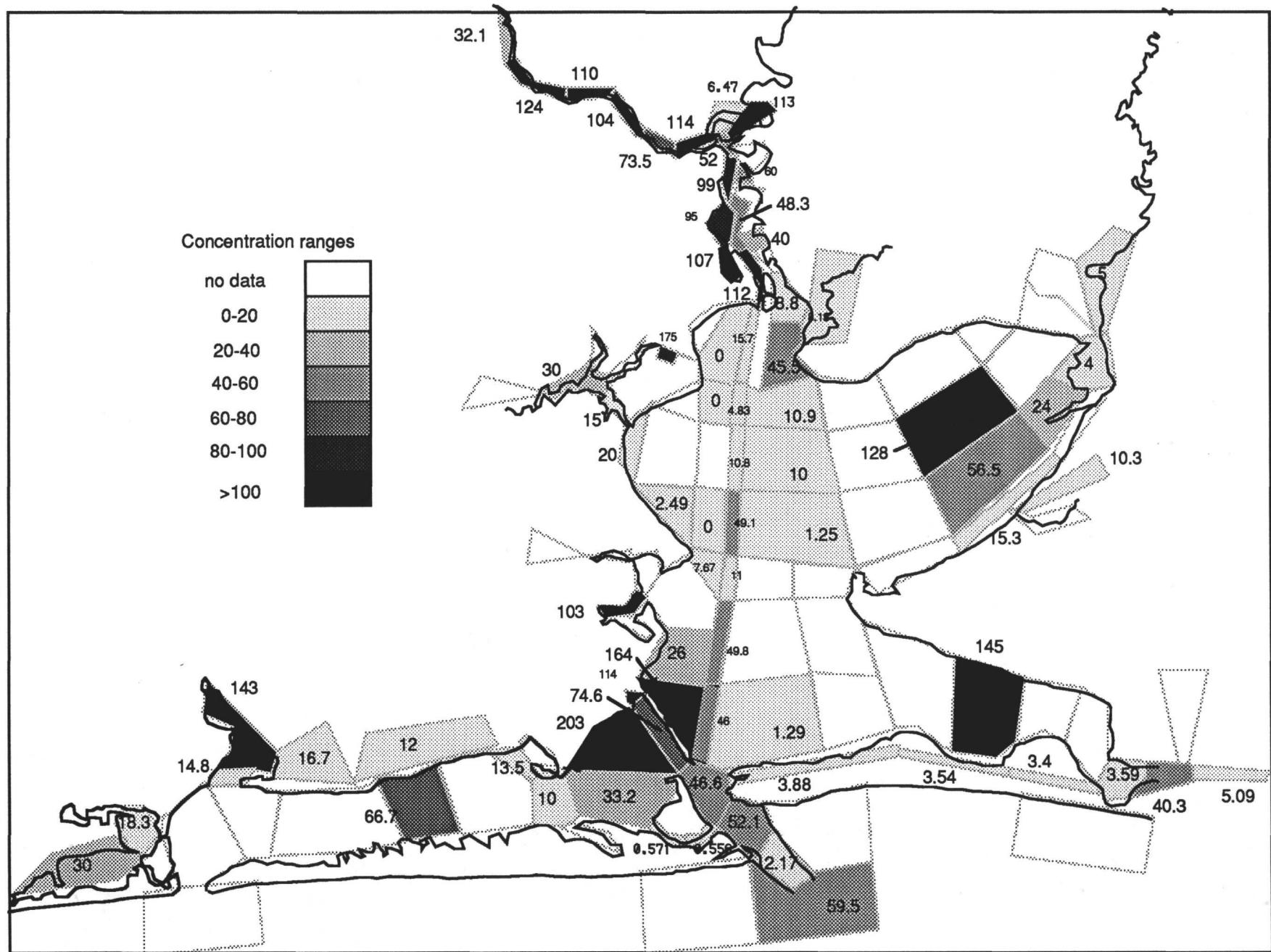


Fig. 5-20 Average (with BDL = 0) concentrations of WQMTCUT in Galveston Bay

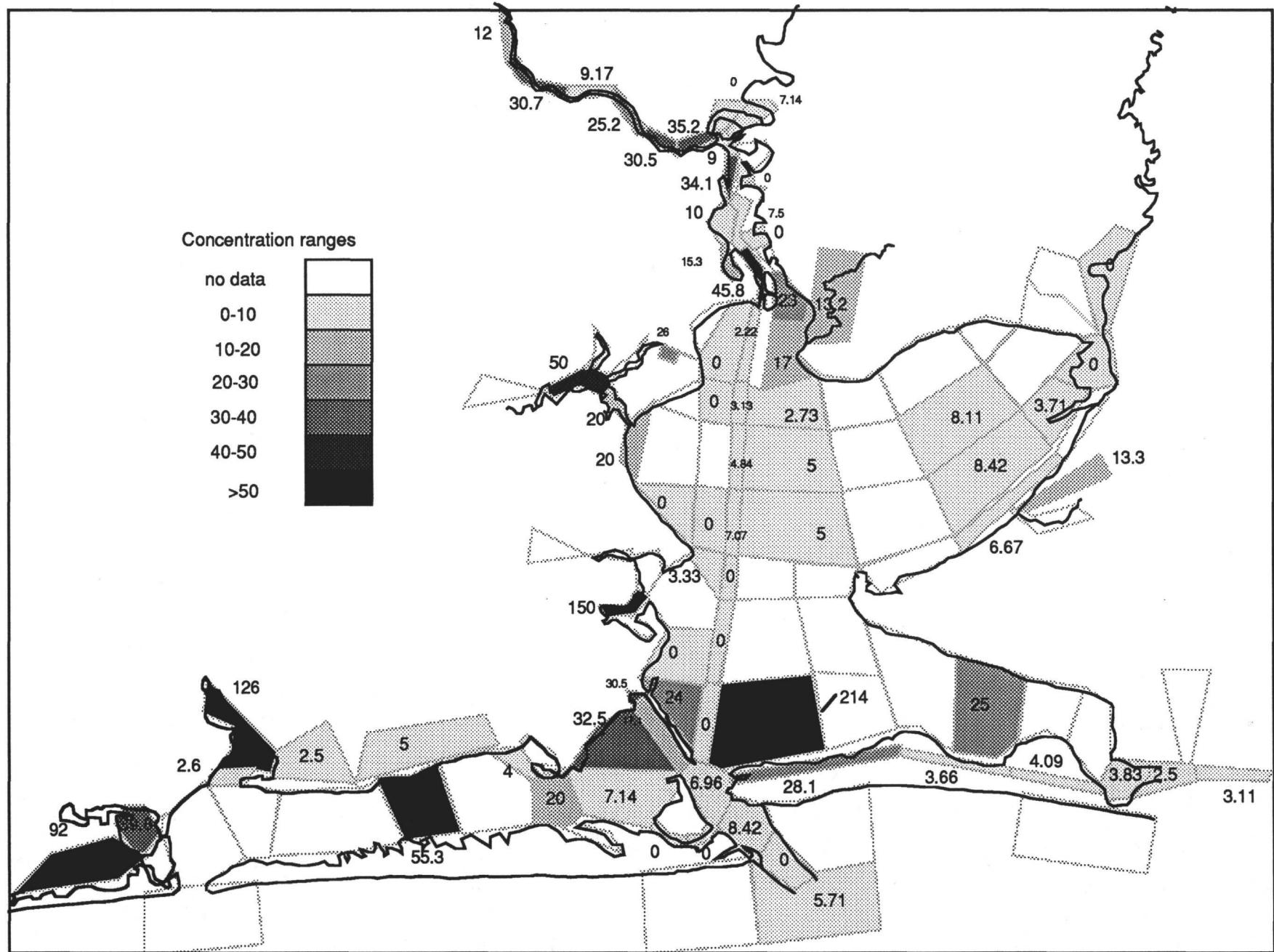


Fig. 5-21 Average (with BDL = 0) concentrations of WQMTPBT in Galveston Bay

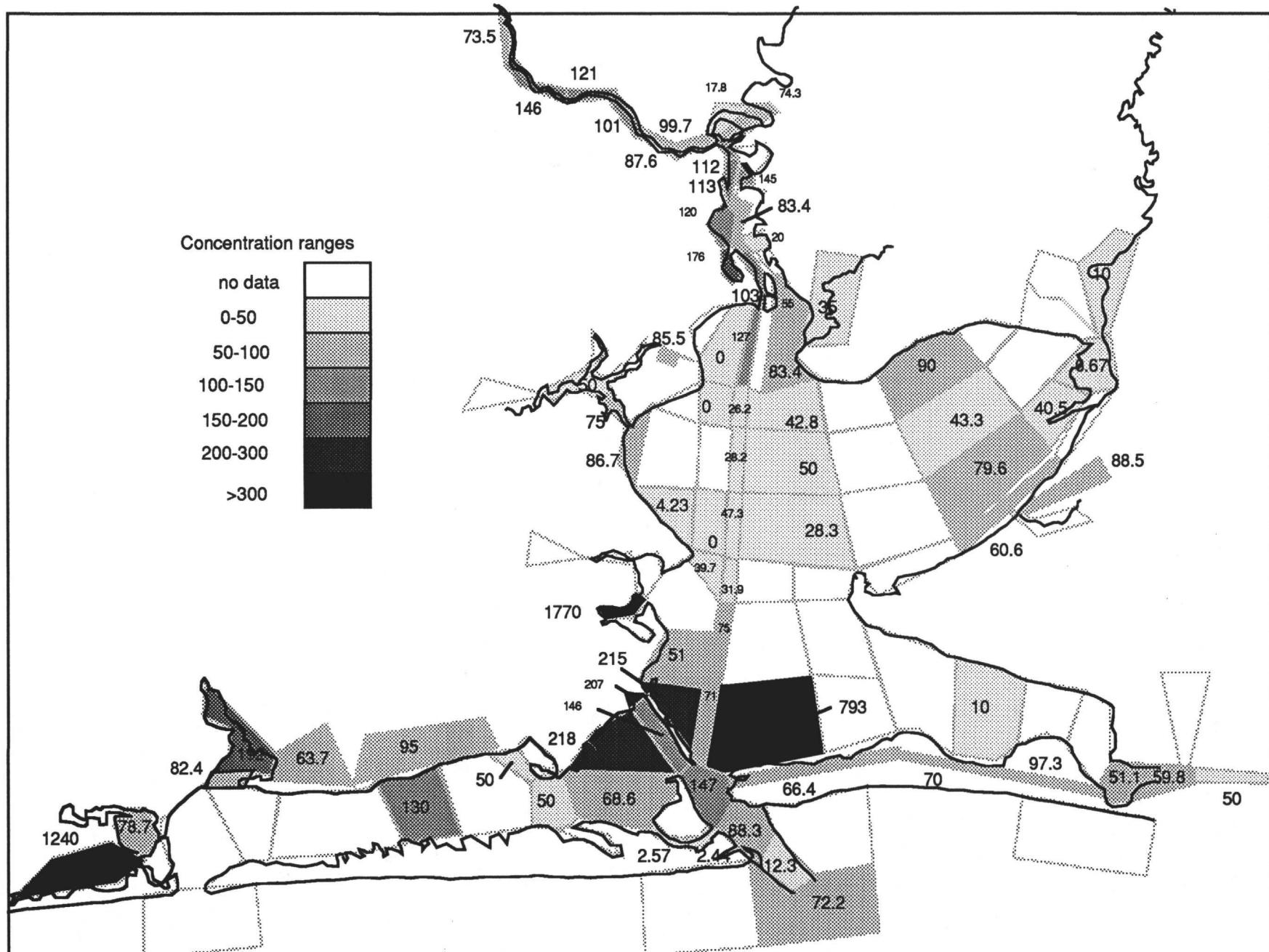


Fig. 5-22 Average (with BDL = 0) concentrations of WQMETZNT in Galveston Bay

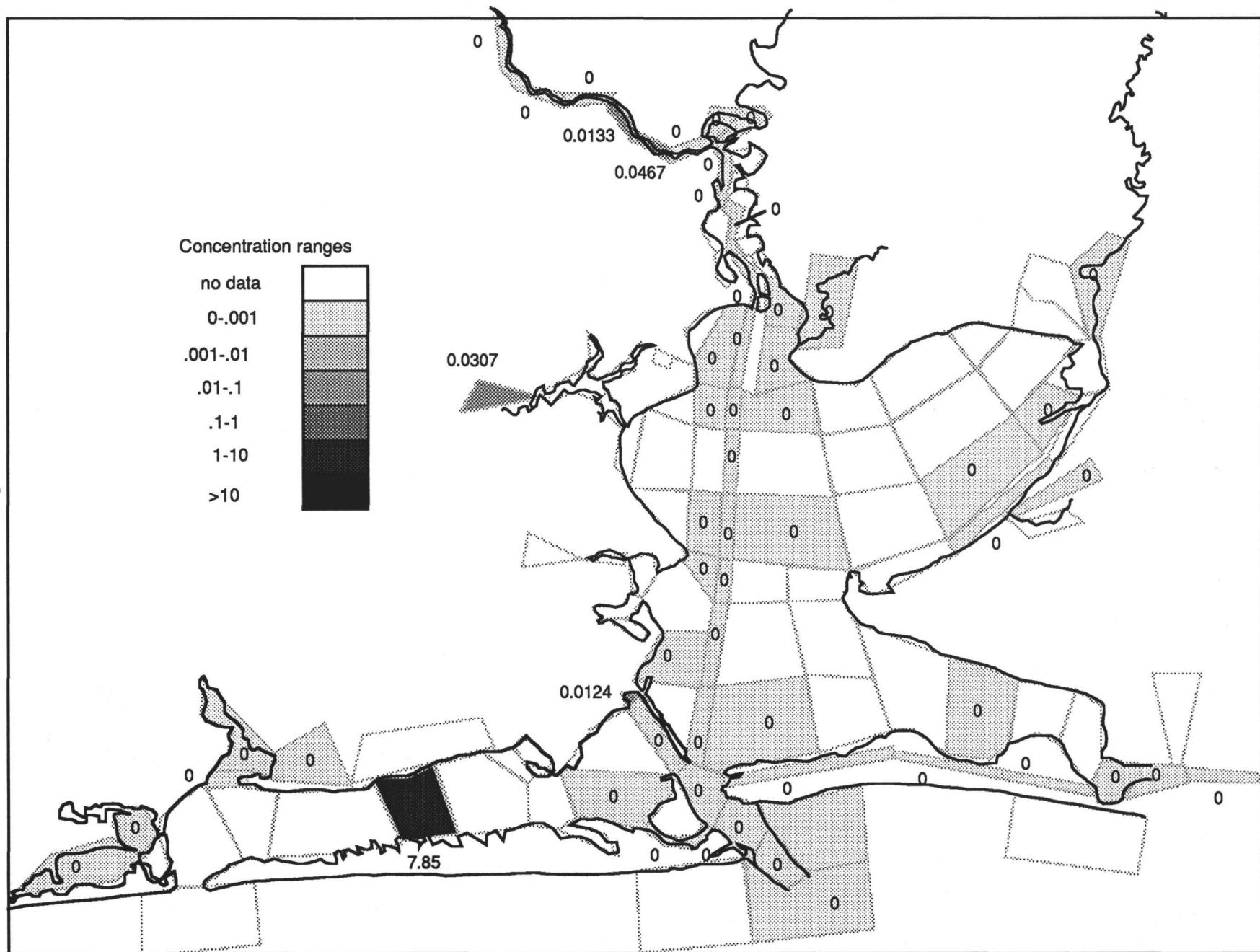


Fig. 5-23 Average (with BDL = 0) concentrations of WQ-XDDT in Galveston Bay

5.2 Time Trends in Water Quality

The second table of each pair of statistical analyses, e.g. Tables 5-3 and 5-5, presents the Time Trend Analysis. This was approached by a linear regression of the (non-BDL) measurements versus time. The period of record, the period used for the time-trend analysis (which may differ from the former because BDL values are part of the measurement record but are excluded from the trend analysis), and the average observations per year entering the analysis all provide an indication of the validity of the trend analysis. Clearly, the shorter the period of time over which usable data are available, and the smaller the number of observations per year, the more limited the statistical validity of the trend analysis (though some of the other indicators, such as standard error and residual variance, may be misleadingly sanguine). From the water-quality analysis viewpoint, the most important regression parameter is the slope. This is the average (in the least-squares sense) rate of increase (if positive) or decrease (if negative) in the magnitude of the water quality variate, in units of the variate per year. It is the key indicator of a systematic change in that water-quality variate. The intercept is the average value (least-squares sense) of the trend at the beginning of the period of analysis, cf. the average >DL of the Period of Record Statistics. Finally, the standard error of the estimate (SEE, in units of the variate) and the residual variance (per cent) provide a measure of scatter about the trend line. The larger these two indicators, the greater the scatter about the trend line. This communicates both the extent of observed variability that may be systematic in time, and the uncertainty of the computed trend.

Because of the central importance of the slope of the trend line, two additional parameters are provided in the Time Trend tables to qualify its computation, *viz.* the 95% confidence bounds of the slope of the regression line, given by

$$m \pm t(0.025,n-2) \cdot \sqrt{[SEE^2/(varT)(n-2)]} \quad (5-1)$$

where m denotes the slope of the trend line, n the number of data points, $varT$ the variance of sample date, and $t(r,N)$ is the critical point of Student's t-distribution for a one-sided probability $< r$ with N degrees of freedom. In interpreting this analysis one must bear in mind that this assumes a 1/20 failure rate (i.e., slope judged as significant when it is not). Further, this calculation is subject to the assumption that the available data are an adequate sampling of the population. The above equation measures some of this, in that the accuracy of the slope estimate degenerates, i.e., the confidence bounds become larger, as the scatter about the regression (SEE) increases, the number of data points decreases, and the spread in time ($varT$) decreases. But a handful of data points spuriously clustered at both ends of the period of record can yield a high confidence in the slope, which one would dismiss as fictitious based upon his external knowledge about the normal variability of the water quality variate. In this respect, the behavior of the parameter in neighboring areas of the bay, and direct inspection of the data, should be used in determining whether to accept the statistical calculation of trend. A very small value of SEE can be just as indicative of a spurious correlation, as a high value is of no relationship. We note also that this

analysis does not distinguish between a statistically unresolvable trend and a trend of zero.

Confidence bounds for different levels of uncertainty can be constructed from the data of the time trend table, by backing out the value of $\xi \equiv \sqrt{[SEE^2/(varT)(n-2)]}$ in (5-1) above and selecting a different value of t from a table of t-distributions. The most important indication is when both confidence bounds have the same sign, indicating that the real trend has that sign (with a 97.5% probability). In many instances, the confidence bounds have different signs, but one bound is of much greater absolute magnitude than the other, i.e. the confidence band is highly asymmetric about 0. To determine whether a different choice of confidence limit would have produced bounds of the same sign, it is simpler to merely compare the ratios of the magnitudes of the 95%-bounds as given, rather than to recompute the bounds with a different t-value. One need only specify the ratio $r \equiv t(.025)/t(x)$. If $|b_1|/|b_2| < (r-1)/(r+1)$, then the confidence bounds for the x-level have the same sign. For example, use $t(.05$), corresponding to 90% confidence bounds; an inspection of a table of t-distributions discloses that $r \leq 1.25$ for more than 5 degrees of freedom, hence the 90% confidence bands will have the same sign if the magnitudes of the 95% bands (that are of different sign) exceed about a 10:1 ratio. Thus one can use the information in these Time Trend tables by quick inspection to estimate other confidence bounds on the slope.

As with the Period of Record statistics, special treatment is given temperature, salinity and dissolved oxygen. Analyses of near-surface data, seasonally aggregated (in the case of temperature and salinity), are presented in Tables 5-29 through 5-34, the companion tables to Tables 5-5 through 5-10. The log-transformed coliform analyses are shown in Tables 5-35 and 5-36, companions to Tables 5-11 and 5-12. These regressions are of the logarithm of coliforms versus time, corresponding to an exponential variation of concentration with time.

Spatial structure in water quality trends in Galveston Bay is important, because the regional coherence of trends is a strong indicator of whether the trends are real or are some statistical artifact (including the 1/40 random error). In Figs. 5-24 *et seq.*, the distribution of positive and negative trends for key parameters is depicted graphically, by zones of "probable" trends, in which the 95% confidence bounds have the same sign, and "possible" trends taken to be 80% confidence bounds (i.e., a 1/10 failure rate). The depictions of these figures are based upon the time-trend tables given in Appendix B, except for the specially treated salinity, temperature, DO and coliform data of Tables 5-29 *et seq.* For a few, especially significant trends, the data and time regression line are plotted for selected hydrographic segments, e.g. Fig 5-26.

Table 5-29
 Time Trend Analysis for Hydrographic Segments: WQTEMP
 Winter (December-February) temperatures within upper 0.5 m

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
C1	631202	891211	4.5	0.0767	14	3.27	0.0072	0.15
C2	580113	901210	6.5	0.0457	13	3.38	0.00011	0.091
C3	580127	900214	0.97	0.152	13	3.64	-0.0072	0.31
C4	580113	880113	1.7	-0.0988	13	3.81	-0.35	0.15
C5	581202	901210	6.4	0.0343	13	3.81	-0.022	0.091
C6	641215	861203	1.2	-0.164	14	3.27	-0.32	-0.0048
D1	640217	900117	2.7	-0.0603	14	3.39	-0.16	0.04
D2	630104	880218	2.5	-0.036	13	3.98	-0.17	0.097
D3	630104	910226	3.1	0.00911	13	3.37	-0.066	0.084
D4	520109	900214	2	-0.0954	16	4.14	-0.26	0.072
D5	710210	900214	1.4	0.13	13	2.66	-0.094	0.35
E1	630108	910228	15	0.0147	12	3.94	-0.021	0.051
E2	630108	910228	14	0.0117	12	3.7	-0.025	0.048
E3	630122	910213	3.7	-0.116	13	4.1	-0.19	-0.039
E4	630108	910213	6.9	-0.0158	13	4.07	-0.076	0.044
E5	630108	880125	1.9	0.242	12	3.85	0.087	0.4
E8	630122	651214	8.6	3.45	8.8	3.22	1.6	5.3
E9	630108	900207	0.55	0.193	12	2.78	-0.0098	0.4
E10	841207	860219	2.5	5.93	9.3	4.13	-93	100
G1	630110	910102	3.5	-0.0241	13	3.04	-0.09	0.041
G2	860110	900111	0.75	1.24	10	1.71	-10	13
G3	631218	910102	4	0.0286	12	3.66	-0.065	0.12
G4	630104	910102	6.9	0.00452	13	3.6	-0.048	0.057
G5	630111	910226	5.2	-0.0252	13	3.33	-0.085	0.034
G6	630104	910226	4.2	0.0798	13	4.26	0.006	0.15
G7	500227	910228	11	-0.0091	13	3.33	-0.038	0.02
G8	520117	910228	2	-0.0224	13	3.78	-0.097	0.053
G9	630104	900213	3.8	0.0363	12	3.25	-0.027	0.1
G10	630110	910102	3.4	0.0314	12	3.5	-0.044	0.11
G11	841209	900226	3.1	-0.0090	12	3.8	-1.3	1.3
G12	770203	900104	1.2	0.225	8.9	3.24	-0.22	0.67
G13	511213	910226	6.2	-0.0223	13	3.35	-0.068	0.023
G14	500111	910226	2.6	0.00946	12	3.33	-0.058	0.077
G15	630110	910226	4.2	0.0135	13	3.42	-0.049	0.076
G16	681210	900212	1.3	0.0325	13	2.86	-0.12	0.18
G17	680116	910226	1.6	-0.0247	13	3.23	-0.21	0.16
G18	630110	910226	6.1	0.013	12	3.14	-0.037	0.063
G19	630125	910228	6.9	0.015	12	2.99	-0.032	0.062

Table 5-29
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
G20	630110	910226	3.4	0.0274	12	2.91	-0.031	0.086
G21	630125	641214	8.5	0.165	11	2.07	-2.2	2.5
G22	631218	901212	2.5	0.0905	11	2.93	-0.0082	0.19
G23	630110	901212	5.2	-0.015	13	3.17	-0.066	0.037
G24	630110	901212	5	-0.0066	12	3.38	-0.066	0.053
G25	630110	900223	2.7	-0.0587	12	3.03	-0.12	0.0058
G26	520205	900223	2.2	0.0423	10	3	-0.032	0.12
G27	510111	900223	2.4	-0.0078	13	3.19	-0.11	0.091
G28	630110	900212	1.7	0.0369	12	3.18	-0.047	0.12
G29	630108	910228	8.8	0.0402	11	3.26	0.00053	0.08
G30	510111	910228	6.3	-0.0248	13	3.46	-0.068	0.019
G31	511213	900212	2.6	0.068	10	4.35	-0.013	0.15
G32	630108	900212	3.5	0.134	11	3.97	0.057	0.21
G33	641216	900222	0.12	0.0316	13	0.798	-0.93	1
G34	630109	910228	3.9	0.0397	12	2.62	-0.0072	0.086
G35	630109	880216	1.7	-0.0011	13	2.73	-0.095	0.092
G36	630109	720215	6.4	0.258	12	2.32	0.0096	0.51
H1	581204	910102	5.4	0.0283	13	2.79	-0.013	0.069
H3	641209	860206	0.76	0.00187	14	3.43	-0.23	0.23
H4	740214	890221	1.1	-0.131	14	3.14	-0.51	0.24
H5	740214	900118	1.8	-0.102	15	2.81	-0.34	0.13
H7	571202	900110	5	0.0998	12	2.39	0.05	0.15
H8	571202	900118	2.1	0.0854	12	2.66	0.036	0.13
H10	571202	891211	4.5	0.0474	12	2.83	-0.013	0.11
H11	571202	900222	4.2	0.0859	12	2.4	0.052	0.12
H12	571202	850227	2.2	0.0919	13	3.38	0.0066	0.18
H13	571202	900222	3.4	0.0765	13	2.53	0.036	0.12
H14	580116	900126	2.1	0.0917	13	2.38	0.037	0.15
H15	720210	900222	3.9	0.0252	15	2.1	-0.064	0.11
H16	681210	900126	0.62	0.0384	16	1.41	-0.074	0.15
H17	681210	900222	8.2	0.00371	16	2.06	-0.05	0.058
H18	731205	850227	1.2	-0.346	18	3.65	-0.92	0.22
H19	681210	900222	4.2	0.0375	15	2.4	-0.039	0.11
H20	720111	900222	8.1	0.16	14	3.14	0.071	0.25
M1	880128	900112	1.5	-3.17	18	2.7	-46	40
M3	630109	760217	2.9	0.551	11	2.38	0.35	0.75
S1	580203	850227	0.81	0.161	11	1.89	0.075	0.25
T1	610201	901212	5.2	-0.0228	12	3.54	-0.075	0.029
T2	610201	901212	4.9	-0.0222	13	3.49	-0.086	0.042

Table 5-29
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcp @ start	SEE	lower	upper
T3	661203	900212	2.5	0.0511	13	4.43	-0.12	0.23
T4	640121	901212	3.9	0.00219	12	3.14	-0.067	0.072
T5	630110	901211	3.7	-0.0061	12	3.18	-0.073	0.06
T6	610201	900208	4.5	-0.0526	13	3.35	-0.12	0.019
T7	661203	871208	1.8	0.0665	12	3.48	-0.2	0.33
T8	661203	760225	13	-0.312	13	3.82	-0.53	-0.095
T9	661203	900226	4.7	0.00599	12	4.03	-0.12	0.13
T10	610201	901212	9.1	-0.0057	12	3.46	-0.048	0.036
T11	611206	901211	7.7	-0.0106	12	3.36	-0.055	0.034
T12	691202	881213	2.2	-0.0168	12	2.36	-0.17	0.13
T13	650211	881207	0.38	-0.032	14	3.26	-0.43	0.36
T14	781205	900117	0.9	0.0461	17	3.88	-0.96	1.1
T15	610210	900117	3.7	-0.0161	13	3.83	-0.1	0.071
T16	771208	890123	0.54	0.297	11	2.94	-0.56	1.2
T17	740109	820126	0.87	-0.0995	12	3.31	-1.5	1.3
T18	630110	860106	2.3	-0.0715	12	3.28	-0.21	0.067
W1	690210	910227	3.5	0.236	12	4.63	0.071	0.4
W2	690210	910227	3.6	0.0552	14	3.43	-0.089	0.2
W3	690210	910227	0.73	0.13	12	4.97	-0.26	0.52
W4	681210	901213	3	0.224	11	3.89	0.091	0.36
W5	740212	891228	1.9	0.106	13	4.26	-0.18	0.39
W6	640220	910225	3.5	0.0186	13	3.19	-0.057	0.095
W7	640220	900227	3.2	0.0486	13	3.36	-0.059	0.16
W8	640220	901218	1.8	-0.0801	15	3.37	-0.21	0.049
W9	641214	910212	4.5	0.0926	12	3.73	-0.02	0.21
W10	641214	910212	7.3	-0.0122	13	3.57	-0.094	0.07
W11	641214	910225	6.4	-0.0084	13	3.88	-0.1	0.084
W12	641214	910225	5.1	0.261	9.3	3.73	0.12	0.4
W13	641214	910225	1.3	0.0347	13	3.28	-0.11	0.18
W14	510112	901213	0.73	-0.0281	15	4.36	-0.21	0.16
W15	641214	910225	4.2	-0.0076	13	3.06	-0.092	0.077
W16	641207	910207	5.6	0.0424	12	3.35	-0.021	0.11
W17	641207	901206	1.4	0.147	11	3.17	0.0095	0.28
W18	640130	900109	0.85	0.0911	12	2.92	-0.056	0.24
W19	641203	890217	0.99	-0.0016	13	2.71	-0.13	0.13
W20	771212	890201	0.45	0.633	13	1.31	0.054	1.2
W21	501215	901213	4.1	-0.01	13	2.94	-0.066	0.046

Table 5-30
 Time Trend Analysis for Hydrographic Segments: WQTEMP
 Summer (July-August) temperatures within upper 0.5 m

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
C1	630701	860723	3.6	0.0209	30	1.81	-0.025	0.067
C2	580707	870818	6	0.0288	30	1.91	-0.0011	0.059
C3	580707	830721	0.96	-0.0514	31	1.96	-0.18	0.076
C4	580707	880711	1.2	0.0249	31	1.68	-0.066	0.12
C5	580714	870818	4.9	-0.0134	31	2.09	-0.05	0.023
C6	640716	890809	1.4	-0.0777	31	1.63	-0.13	-0.026
D1	640713	900710	2.2	0.0433	29	1.43	-0.00066	0.087
D2	630708	900710	1.7	-0.0361	30	1.42	-0.082	0.0098
D3	630708	910813	2.4	-0.0396	30	1.25	-0.071	-0.0086
D4	500831	880707	1.1	0.00774	30	1.49	-0.058	0.073
D5	500831	880803	0.32	0.0588	28	1.23	-0.031	0.15
E1	630710	910729	10	-0.0164	30	1.15	-0.029	-0.0037
E2	630710	910729	8.5	-0.0198	30	0.989	-0.032	-0.0074
E3	630710	910729	6	-0.0327	30	1.93	-0.073	0.0076
E4	630711	910729	5.7	-0.0213	30	1.29	-0.047	0.0042
E5	630711	890727	1.2	-0.0496	31	1.73	-0.15	0.049
E8	630711	850710	0.95	0.00176	31	1.67	-0.17	0.18
E9	630710	890828	0.46	0.0584	30	0.716	-0.00055	0.12
G1	630708	910813	2.1	-0.0213	31	1.23	-0.057	0.014
G3	630708	910813	2.4	-0.0162	30	1.38	-0.054	0.022
G4	630702	910813	3.9	-0.0139	30	1.42	-0.044	0.016
G5	630708	910813	3.6	-0.0493	31	1.28	-0.076	-0.022
G6	630708	910813	3	-0.0029	31	2.29	-0.051	0.046
G7	500705	910813	7.4	-0.0333	30	1.4	-0.048	-0.019
G8	500705	890809	1.5	0.0156	29	1.47	-0.024	0.055
G9	630708	890809	3	-0.0383	30	1.6	-0.076	-0.0011
G10	630708	910813	2.6	-0.0538	31	0.943	-0.075	-0.032
G11	850702	860819	4.4	0.78	30	1.43	-4.4	5.9
G12	760719	890705	1	-0.0915	30	2.49	-0.43	0.24
G13	500810	910813	2.9	-0.0409	31	1.31	-0.065	-0.017
G14	500712	910813	1.5	-0.0183	30	1.45	-0.054	0.017
G15	630708	910813	3.2	-0.057	31	1	-0.08	-0.034
G16	680716	890810	1.6	0.0065	30	1.02	-0.052	0.065
G17	710810	910813	1	-0.0455	30	1.51	-0.18	0.087
G18	630708	910813	3.5	-0.0496	31	1.31	-0.077	-0.022
G19	630708	910813	4.1	-0.0648	31	1.16	-0.087	-0.042
G20	630708	910813	2.4	-0.0441	30	1.08	-0.07	-0.018
G21	630708	860724	0.52	-0.0107	31	1.21	-0.11	0.089

Table 5-30
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrep @ start	SEE	lower	upper
G22	630708	910717	1.6	-0.0196	30	1.1	-0.059	0.02
G23	630708	910717	4	-0.0343	31	1.32	-0.06	-0.0082
G24	630709	910717	3.9	-0.0153	30	1.34	-0.043	0.012
G25	630708	890824	1.7	-0.0914	32	1.26	-0.13	-0.056
G26	630709	890824	2.2	-0.0948	32	1.32	-0.14	-0.049
G27	500712	890824	1.3	0.0162	29	1.02	-0.012	0.045
G28	630709	890824	1.5	-0.0554	31	0.885	-0.083	-0.028
G29	630709	910729	7.1	-0.0323	30	1.04	-0.047	-0.018
G30	500712	910702	3.1	-0.0061	30	2.11	-0.042	0.03
G31	500712	890822	2	-0.0175	31	0.949	-0.036	0.00096
G32	630709	890822	2.1	-0.0445	31	1.01	-0.071	-0.018
G33	640720	860723	0.27	0.00218	29	1.35	-0.25	0.25
G34	630705	910729	3.1	-0.0472	30	1.22	-0.076	-0.019
G35	630705	890706	1.2	-0.0405	30	1.11	-0.088	0.007
G36	630705	710817	4.9	-0.389	31	1.04	-0.54	-0.24
H1	580806	910813	4.4	0.0183	30	1.22	-0.002	0.039
H3	630820	880711	1.2	-0.042	31	1.11	-0.11	0.022
H4	740813	900828	1.5	-0.0883	31	1.44	-0.21	0.038
H5	740813	900711	2.4	-0.092	32	1.11	-0.19	0.0025
H7	580702	860819	7	0.0239	30	1.15	0.0088	0.039
H8	580702	900711	2.1	0.0362	29	0.97	0.017	0.056
H10	580702	840711	4.1	0.0159	29	1.36	-0.012	0.044
H11	580702	900813	3.9	0.00904	30	1.03	-0.0073	0.025
H12	580702	840711	2.4	-0.0036	31	0.994	-0.028	0.02
H13	580702	900711	3.3	-0.0134	31	1.06	-0.034	0.0074
H14	580702	900825	2	-0.0147	31	1.64	-0.051	0.022
H15	720802	900813	5	0.036	30	1.13	-0.016	0.088
H16	680716	840711	2.1	-0.175	33	1.21	-0.26	-0.092
H17	680716	900813	8.6	-0.0384	31	1.96	-0.097	0.02
H18	730801	840711	3.2	0.0405	30	1.39	-0.13	0.21
H19	680716	900711	3.8	0.00545	30	1.23	-0.04	0.051
H20	720802	900813	9.6	0.0801	28	1.62	0.027	0.13
M3	630705	750825	1.6	0.082	31	1.33	-0.057	0.22
S1	580702	840711	1	-0.016	31	0.801	-0.048	0.016
T1	610706	910717	3.4	-0.0136	30	1.36	-0.038	0.011
T2	610706	910717	3.6	-0.0031	30	1.57	-0.038	0.032
T3	660701	900809	1.8	0.0549	29	2.57	-0.053	0.16
T4	630710	910717	3	-0.032	30	1.18	-0.062	-0.002
T5	630709	910702	3.2	-0.0563	31	1.27	-0.086	-0.027

Table 5-30
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
T6	610706	910717	3.5	-0.0258	30	2.27	-0.074	0.022
T7	660701	670819	21	-1.69	30	2.21	-3.6	0.24
T8	660701	750820	9.2	-0.395	30	2.43	-0.55	-0.24
T9	660701	900828	3.3	0.0675	29	2.07	-0.00031	0.14
T10	610706	910717	5.4	-0.0094	30	1.33	-0.031	0.012
T11	610706	910717	6.5	-0.044	30	1.34	-0.064	-0.024
T12	700707	890824	0.78	0.0241	30	0.691	-0.066	0.11
T13	650715	850826	0.35	0.117	29	2.54	-0.32	0.56
T14	850716	890718	1	-0.989	32	1.38	-3.6	1.6
T15	610706	890718	3.7	0.0114	30	2.3	-0.038	0.061
T16	790706	860714	0.43	0.173	30	0.49	-1.9	2.3
T17	740731	820712	0.5	-0.0563	29	1.43	-1.4	1.3
T18	630709	850807	1.6	-0.04	30	2.09	-0.14	0.063
W1	680716	890809	2.1	-0.0622	30	1.15	-0.12	-0.0028
W2	510815	880822	1.2	-0.0093	30	1.53	-0.083	0.065
W3	720824	880718	0.63	0.0083	30	0.965	-0.17	0.19
W4	680716	890706	2.3	0.0468	29	1.23	-0.0019	0.096
W5	740828	870818	0.62	-0.155	30	1.17	-0.39	0.082
W6	510815	890705	1.5	-0.0464	31	1.34	-0.092	-0.0011
W7	630724	890803	2	-0.0073	30	1.88	-0.083	0.068
W8	650811	870722	1	0.0613	30	1.17	-0.023	0.15
W9	630724	890803	2.5	-0.0126	30	1.23	-0.048	0.023
W10	630724	890803	4.1	-0.0208	30	1.24	-0.054	0.012
W11	630724	890803	3	-0.0512	30	1.63	-0.094	-0.0085
W12	500707	880718	1.6	0.00915	30	1.28	-0.031	0.049
W13	630724	890803	0.69	-0.0469	31	1.43	-0.13	0.034
W14	500707	880822	0.39	-0.0525	30	2.73	-0.16	0.053
W15	500809	880718	1.2	-0.0151	30	1.33	-0.063	0.033
W16	500809	910729	2.7	-0.0262	30	1.28	-0.055	0.0027
W17	630805	910729	0.93	-0.0571	31	2.27	-0.17	0.056
W18	630805	910729	0.64	-0.111	32	1.59	-0.2	-0.018
W19	640709	880803	0.71	-0.0028	30	1.11	-0.084	0.079
W21	500809	870820	1.7	0.0035	28	1.85	-0.049	0.056

Table 5-31
Time Trend Analysis for Hydrographic Segments: WQSAL
Salinities within upper 1.5 m (5 ft)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>		SEE	<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcp @ start		lower	upper
C1	630402	900910	14	0.00597	6.5	5.27	-0.054	0.066
C2	580113	901210	26	0.0348	10	5.77	-0.0046	0.074
C3	580127	900214	3.2	0.0858	9	6.37	-0.079	0.25
C4	580113	890424	5.5	0.372	8	5.46	0.21	0.54
C5	580714	901210	25	0.0352	12	6.1	-0.01	0.08
C6	640317	900627	7.7	-0.0332	11	6	-0.11	0.047
D1	640217	900710	14	-0.142	7.2	4.76	-0.2	-0.084
D2	630104	900710	10	0.0727	10	6.24	-0.015	0.16
D3	630104	910813	12	-0.258	19	5.93	-0.32	-0.19
D4	500831	900815	9.3	0.134	10	6	0.038	0.23
D5	500831	900428	2.1	0.0955	11	5.49	-0.054	0.25
E1	500928	910729	41	-0.119	18	5.68	-0.14	-0.093
E2	580310	910729	42	-0.103	16	5.47	-0.13	-0.075
E3	580310	910729	20	-0.125	16	5.58	-0.17	-0.079
E4	580310	910729	29	-0.0927	14	5.48	-0.13	-0.055
E5	580310	900612	7.2	-0.0662	16	6.44	-0.16	0.032
E6	790820	900423	1.8	-0.64	14	7.35	-1.8	0.56
E8	630122	900611	4.7	-0.0694	10	6.08	-0.3	0.16
E9	630108	900523	2.7	-0.188	19	5.59	-0.34	-0.031
E10	841207	860423	3.6	2.24	15	4.1	-12	17
G1	630110	910813	12	-0.171	17	5.15	-0.23	-0.11
G2	731105	900719	5.3	0.221	12	5.27	-0.017	0.46
G3	580224	910813	12	-0.00853	15	5.59	-0.074	0.057
G4	630104	910813	25	-0.149	16	5.78	-0.19	-0.11
G5	580408	910813	15	-0.148	18	5.81	-0.2	-0.098
G6	580326	910813	14	-0.158	19	5.72	-0.21	-0.11
G7	500705	910813	40	-0.191	22	6.32	-0.22	-0.16
G8	500424	910228	7.4	-0.153	23	6.48	-0.22	-0.082
G9	630104	900620	15	-0.0265	23	6.45	-0.09	0.037
G10	630110	910813	12	-0.0905	17	5.76	-0.15	-0.03
G11	580326	900402	1.6	0.124	12	5.59	-0.15	0.4
G12	760719	900618	5.2	0.0934	15	6.57	-0.26	0.45
G13	500810	910813	19	-0.071	16	6.39	-0.12	-0.025
G14	500111	910813	8.3	-0.094	17	6.1	-0.16	-0.027
G15	580224	910813	13	-0.161	18	5.79	-0.21	-0.11

Table 5-31
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
G16	680716	900618	5.9	0.0376	15	6.13	-0.11	0.19
G17	730207	910813	6.2	-0.0547	14	6.33	-0.34	0.23
G18	630110	910813	28	-0.0737	16	6.78	-0.13	-0.021
G19	580312	910813	16	-0.249	20	6.74	-0.31	-0.19
G20	630110	910813	11	-0.22	21	6.63	-0.29	-0.15
G21	630110	880517	3	-0.073	27	5.56	-0.32	0.17
G22	630611	910717	8.9	0.0106	12	6.06	-0.098	0.12
G23	630110	910717	23	-0.11	14	6.14	-0.16	-0.063
G24	580507	910717	17	-0.111	15	6.39	-0.17	-0.054
G25	630110	900223	11	-0.232	18	6.35	-0.3	-0.16
G26	520205	900606	9.9	-0.0351	15	6.68	-0.11	0.045
G27	500605	900606	9.2	-0.00428	16	6.93	-0.099	0.09
G28	580310	900606	7.3	-0.0278	18	6.07	-0.097	0.041
G29	580310	910729	25	-0.296	25	7.09	-0.34	-0.25
G30	500510	910702	20	-0.0995	15	6.98	-0.15	-0.053
G31	500712	900606	10	-0.179	23	5.85	-0.23	-0.12
G32	580310	901008	15	-0.16	21	6.11	-0.21	-0.11
G33	640331	900306	1.2	-0.169	21	6	-0.42	0.078
G34	580310	910729	11	-0.23	26	6.06	-0.29	-0.17
G35	630109	900516	6.6	-0.00152	25	6.26	-0.11	0.1
G36	630109	750611	19	-0.272	28	4.7	-0.49	-0.055
G37	820427	901113	5.6	0.247	23	5.38	-0.41	0.9
G38	890426	890427	730					
H1	580806	910813	21	-0.0205	13	6.13	-0.067	0.026
H2	730214	900711	5	0.17	11	5.66	-0.087	0.43
H3	640422	890415	4.1	-0.0466	13	5.81	-0.19	0.098
H4	730911	900828	5	0.192	9.2	4.87	-0.011	0.39
H5	730911	900711	7.8	0.181	8.9	5.13	0.0061	0.36
H6	750418	880928	1.2	0.594	7.2	5.44	-0.013	1.2
H7	571003	900110	15	0.145	8.4	5.25	0.099	0.19
H8	571003	900711	8.1	0.207	5.1	4.92	0.16	0.26
H9	870504	900319	1.7	3.26	4.5	6.46	-5.4	12
H10	571003	900711	15	0.148	5.6	4.45	0.11	0.19
H11	580130	900813	13	0.0759	8.9	5.61	0.026	0.13
H12	571205	850227	5.6	0.0499	8.2	5.56	-0.035	0.13
H13	571003	900711	14	0.0287	8.5	5.31	-0.019	0.077

Table 5-31
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
H14	580130	900825	6.9	0.058	7.2	4.61	-0.003	0.12
H15	671001	900813	15	0.119	5.7	4.27	0.034	0.2
H16	680716	900126	3.4	-0.139	9.3	3.81	-0.27	-0.0029
H17	671001	900813	35	0.0389	5.1	3.82	-0.009	0.087
H18	730801	850227	6.8	0.377	-0.37	1.41	0.29	0.47
H19	680716	900711	19	-0.0673	4.1	3.12	-0.11	-0.02
H20	720324	900813	37	0.0591	0.32	1.53	0.037	0.081
M1	880128	900112	1.5	3.48	24	1.78	-25	32
M3	630109	760331	11	-0.251	30	4.22	-0.41	-0.088
M4	880927	880927	1					
M6	830509	830510	730					
S1	580206	900425	2.8	-0.000255	7.4	5	-0.11	0.11
T1	610201	910717	22	0.00144	11	6.68	-0.045	0.048
T2	580311	910717	17	0.000498	8.2	6.04	-0.053	0.054
T3	660315	900809	11	0.189	4.8	5.6	0.091	0.29
T4	630903	910717	12	0.278	4.2	6.26	0.17	0.39
T5	580422	910702	14	-0.0655	10	6.75	-0.13	0.0016
T6	610201	910717	20	0.0522	4.7	5.56	0.0012	0.1
T7	660315	880523	7.2	0.0969	4.1	4.01	-0.13	0.32
T8	660315	760519	54	-0.104	2.2	2.68	-0.17	-0.036
T9	660315	900828	19	-0.00466	0.42	0.996	-0.019	0.0097
T10	580311	910717	30	-0.0345	11	6.81	-0.076	0.0068
T11	530803	910717	92	0.176	1.8	5.03	0.16	0.19
T12	530803	891120	35	-0.00171	3.2	4.51	-0.038	0.035
T13	650211	881207	1.8	-0.0489	6.7	5.18	-0.3	0.2
T14	751120	900524	4	0.399	7.4	5.79	-0.031	0.83
T15	580226	900523	21	0.0574	7.2	6.26	0.0061	0.11
T16	771003	890511	3.3	-0.0884	9.5	5.93	-0.6	0.42
T17	740109	881115	1.4	0.994	0.39	4.1	0.56	1.4
T18	630110	880628	7.8	-0.361	8.5	5.63	-0.5	-0.22
W1	680418	910430	18	0.152	22	6.28	0.052	0.25
W2	501012	910430	11	0.00167	22	7.86	-0.13	0.14
W3	680501	910430	3.8	0.0921	14	7.72	-0.17	0.35
W4	680716	901213	14	-0.0654	27	5.83	-0.16	0.029
W5	731113	900501	6.5	0.212	22	5.7	-0.0078	0.43
W6	500919	910424	7.4	-0.215	25	6.76	-0.3	-0.13

Table 5-31
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
W7	630724	901218	17	0.343	10	7.18	0.25	0.44
W8	631016	901218	7.1	0.391	3.8	5.55	0.28	0.5
W9	630724	910424	14	-0.106	25	6.21	-0.2	-0.0095
W10	640730	910424	25	-0.0752	24	6.31	-0.15	-0.0028
W11	501011	910424	13	-0.0755	24	6.16	-0.15	0.00098
W12	500707	910424	11	-0.0577	21	6.02	-0.13	0.012
W13	630807	910424	4.9	-0.139	23	5.73	-0.26	-0.014
W14	500614	901213	4	0.105	18	5.8	0.021	0.19
W15	500809	910424	8.8	-0.17	25	5.94	-0.24	-0.097
W16	500809	910729	19	-0.143	27	5.88	-0.19	-0.092
W17	500914	910729	4.2	-0.12	25	6.02	-0.22	-0.016
W18	630805	910729	7.8	-0.0393	22	5.68	-0.14	0.064
W19	640709	900213	5.4	-0.0667	23	5.72	-0.2	0.065
W20	771212	900626	3	0.387	16	6.49	-0.24	1
W21	500809	901213	13	-0.0818	21	5.69	-0.14	-0.026

Table 5-32
Time Trend Analysis for Hydrographic Segments: WQSAL
Summer (July-September) salinities within upper 1.5 m (5 ft)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>		SEE	<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start		lower	upper
C1	630701	900910	3.5	0.112	6.3	5.36	-0.0086	0.23
C2	580707	890926	7.2	0.0637	9.7	5.62	-0.011	0.14
C3	580707	780711	1.4	0.472	8	5.96	-0.085	1
C4	580707	880711	1.6	0.404	7	5.04	0.14	0.67
C5	580714	890928	6.2	0.0982	10	5.67	0.018	0.18
C6	640716	890912	1.7	-0.226	12	6.85	-0.43	-0.027
D1	640713	900710	2.7	-0.153	5.3	3.62	-0.26	-0.05
D2	630708	900710	2.4	0.0674	11	6.2	-0.1	0.24
D3	630708	910813	3.1	-0.254	20	6.08	-0.39	-0.12
D4	500831	900815	2.1	0.127	11	6.17	-0.041	0.3
D5	500831	890912	0.36	-0.207	17	3.34	-0.4	-0.014
E1	500928	910729	8.7	-0.158	19	6.45	-0.22	-0.095
E2	630710	910729	11	-0.188	17	6	-0.25	-0.12
E3	630710	910729	7.4	-0.105	16	5.75	-0.21	-0.0044
E4	630711	910729	7.5	-0.239	14	5.69	-0.34	-0.14
E5	630711	890727	1.8	-0.274	18	5.47	-0.5	-0.051
E6	790820	890727	0.3	-1.14	13	11.2	-33	31
E8	630711	850710	1.4	-0.0793	13	3.11	-0.39	0.23
E9	630710	890828	0.65	-0.416	20	4.48	-0.75	-0.083
G1	630708	910813	2.7	-0.14	19	4.69	-0.26	-0.015
G2	740905	900719	1.3	0.0392	15	4.74	-0.48	0.56
G3	630904	910813	2.8	-0.0825	17	5.78	-0.24	0.073
G4	630702	910813	4.8	-0.136	17	5.25	-0.23	-0.044
G5	630708	910813	4.1	-0.147	18	5.53	-0.25	-0.043
G6	630708	910813	3.8	-0.195	20	5.53	-0.3	-0.093
G7	500705	910813	9.1	-0.143	22	6.75	-0.21	-0.081
G8	500705	890809	1.7	-0.036	23	6.58	-0.2	0.12
G9	630708	890912	3.8	-0.168	28	7.48	-0.32	-0.015
G10	630708	910813	3.3	-0.142	19	5.28	-0.25	-0.034
G11	850702	880908	2.8	0.61	17	5.86	-5.2	6.4
G12	760719	890705	1.3	0.397	11	7.27	-0.47	1.3
G13	500810	910813	3.4	-0.0595	17	6.13	-0.16	0.042
G14	500712	910813	1.8	0.0776	13	5.95	-0.047	0.2
G15	630708	910813	3.6	-0.142	19	5	-0.25	-0.039
G16	680716	890810	2	0.0472	15	5.02	-0.19	0.28
G17	740715	910813	1.2	-0.0080	16	5.77	-0.56	0.54
G18	630708	910813	6.7	-0.0283	18	5.82	-0.12	0.066
G19	630708	910813	3.4	-0.3	23	6.57	-0.45	-0.15

Table 5-32
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
G20	630708	910813	2.4	-0.205	25	6.27	-0.35	-0.062
G21	630708	860724	0.74	-0.177	33	2.17	-0.34	-0.014
G22	640706	910717	2.1	-0.156	14	6.7	-0.4	0.094
G23	630708	910717	5.1	-0.208	15	5.34	-0.3	-0.12
G24	630709	910717	4.6	-0.158	16	6.13	-0.27	-0.041
G25	630708	890918	2.3	-0.274	20	6.23	-0.42	-0.12
G26	630709	890918	3.2	-0.218	20	7.05	-0.42	-0.016
G27	500712	890920	2	-0.0821	20	7.95	-0.26	0.098
G28	630709	890824	2	-0.176	23	6.49	-0.35	-0.0067
G29	630709	910729	7.7	-0.308	26	7.53	-0.41	-0.21
G30	500712	910702	4	-0.115	17	6.62	-0.21	-0.018
G31	500712	890920	2.7	-0.175	23	6.19	-0.28	-0.068
G32	630709	900712	4.1	-0.252	21	6.38	-0.37	-0.13
G33	640720	860723	0.32	-0.583	25	3.86	-1.2	-0.011
G34	630705	910729	3	-0.264	29	5.52	-0.4	-0.13
G35	630705	890706	1.7	-0.0592	30	4.99	-0.22	0.099
G36	630705	710921	6.8	-0.457	32	4.67	-1	0.082
G37	820921	900815	1.5	-0.456	31	3.81	-1.6	0.71
H1	580806	910813	6.1	-0.0537	16	5.34	-0.13	0.023
H2	730911	900711	1.5	-0.115	13	5.62	-0.64	0.4
H3	650719	880928	1.7	0.0366	12	5.93	-0.26	0.34
H4	730911	900828	1.5	0.123	10	3.96	-0.2	0.45
H5	730911	900711	2.5	-0.162	12	4.26	-0.48	0.16
H6	860903	880928	1.5	4.11	8.6	3.08	-42	50
H7	580702	860819	6.8	0.0652	11	4.22	0.0032	0.13
H8	580702	900711	2.2	0.197	5.2	4.33	0.11	0.29
H10	580702	900711	3.4	0.12	6.1	4.05	0.053	0.19
H11	580702	900813	4.2	0.0307	11	4.53	-0.048	0.11
H12	580702	840711	2.3	0.0171	11	3.64	-0.076	0.11
H13	580702	900711	4.4	-0.0787	12	4.51	-0.16	0.0038
H14	580702	900825	2.2	0.157	6.7	3.68	0.071	0.24
H15	720802	900813	6.7	0.0859	7.2	3.51	-0.048	0.22
H16	680716	840711	2.5	-0.0644	9.5	2.78	-0.22	0.095
H17	680716	900813	12	0.0235	5.3	3.56	-0.061	0.11
H18	730801	840711	3.7	0.502	-0.7	1.27	0.37	0.63
H19	680716	900711	5.5	-0.129	4.4	2.3	-0.2	-0.061
H20	720919	900813	13	0.041	0.27	0.916	0.016	0.066
M3	630705	750920	2.3	-0.23	34	3.1	-0.49	0.028
S1	580702	840711	1.2	-0.0207	10	3.28	-0.15	0.11

Table 5-32
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
T1	610706	910717	4.7	-0.0894	12	6.32	-0.19	0.008
T2	610706	910717	4.3	-0.11	9.5	5.19	-0.21	-0.011
T3	660701	900809	2.5	0.159	5.1	5.39	-0.029	0.35
T4	630903	910717	2.7	0.239	5.7	5.93	0.031	0.45
T5	630709	910702	3.8	-0.14	11	6.04	-0.27	-0.013
T6	610706	910717	4.8	-0.0144	5.6	5.14	-0.11	0.078
T7	660701	670923	29	6.19	0.35	2.46	4.6	7.8
T8	660701	750917	14	-0.0937	2	2.22	-0.21	0.024
T9	660701	900828	4.7	-0.0324	0.67	0.754	-0.054	-0.011
T10	610706	910717	6.3	-0.0768	13	6.93	-0.17	0.021
T11	530803	910717	32	0.0609	3.4	4.91	0.026	0.096
T12	530803	890824	14	-0.164	5.1	4.57	-0.24	-0.093
T13	650701	850826	0.35	0.0216	4.2	3.4	-0.49	0.54
T14	850716	890718	3.7	-0.707	16	4.06	-2.5	1.1
T15	610803	890913	5.4	-0.0051	7.7	6.01	-0.11	0.098
T16	790706	870923	0.85	0.493	5.5	5.42	-1.9	2.9
T17	740731	750819	3.8	-0.757	0.92	0.209	-2.2	0.68
T18	630709	850807	2.1	-0.433	7.5	5.41	-0.75	-0.11
W1	680716	890919	3.5	-0.0124	26	6.91	-0.25	0.23
W2	510815	880906	2.4	-0.251	31	9.98	-0.63	0.13
W3	680925	880906	0.85	-0.399	19	8.06	-1.2	0.36
W4	680716	900919	3.7	-0.246	32	8.26	-0.5	0.0031
W5	740828	880906	1.4	0.491	22	8.85	-0.48	1.5
W6	500919	890705	1.8	-0.298	28	8.13	-0.55	-0.042
W7	630724	900906	3.3	0.356	10	9.46	0.07	0.64
W8	650811	890906	2.1	0.539	1.5	5.27	0.31	0.76
W9	630724	890906	3.5	-0.139	29	7.78	-0.37	0.091
W10	640730	900919	6	-0.145	27	8.27	-0.34	0.046
W11	640730	890906	3.8	-0.0095	24	8.04	-0.25	0.23
W12	500707	890929	1.9	-0.356	29	6.51	-0.54	-0.18
W13	630807	890906	1	-0.0828	25	7.22	-0.45	0.28
W14	500707	900919	0.95	0.203	16	7.28	0.039	0.37
W15	500809	900919	1.8	-0.122	27	6.71	-0.32	0.073
W16	500809	910729	4.9	-0.107	29	5.76	-0.2	-0.012
W17	500914	910729	0.76	-0.163	27	7.08	-0.4	0.072
W18	630805	910729	2.2	-0.0912	26	5.28	-0.26	0.078
W19	640709	880803	1.5	0.0488	25	5.27	-0.23	0.33
W20	790920	890915	1.1	0.171	14	7.37	-1.3	1.6
W21	500809	900919	3	-0.0539	22	6.57	-0.19	0.077

Table 5-33
 Time Trend Analysis for Hydrographic Segments:WQDO
 Dissolved oxygen within upper 0.5 m (1.5 ft)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
C1	630402	900910	5.7	0.0344	6.9	2.5	-0.024	0.093
C2	630418	901210	7.2	0.0922	7.4	2.54	0.037	0.15
C3	630418	900214	0.22	0.125	5.4	2.27	-0.13	0.38
C4	850717	890424	1.1	-0.0358	8.1	1.03	-2.3	2.2
C5	641217	901210	10	0.0536	7.4	2.29	0.0036	0.1
C6	671001	900627	3.1	0.0273	6.9	2.17	-0.14	0.19
D1	680715	900710	6	-0.0418	7.6	2.36	-0.11	0.03
D2	630612	900710	4.9	0.011	8.6	2.43	-0.058	0.08
D3	630514	900626	3.9	-0.108	10	2.39	-0.2	-0.011
D4	500831	900815	6.6	-0.0268	9.1	2.26	-0.067	0.014
D5	500831	900428	1.1	0.00426	8.7	2.54	-0.071	0.079
E1	500510	900606	15	-0.0272	9.3	2.14	-0.063	0.0083
E2	680716	901008	26	-0.0239	8.6	2.05	-0.055	0.0073
E3	690422	900611	5.7	-0.112	10	2.24	-0.21	-0.012
E4	690422	900612	7.8	-0.128	10	2.23	-0.2	-0.054
E5	690422	900612	2	0.0354	7.4	2.04	-0.092	0.16
E6	790820	900423	1.7	0.0607	8.4	3.07	-0.46	0.58
E8	850610	900611	1	0.0673	5.2	0.807	-0.6	0.73
E9	850409	900523	2.1	-0.771	9.8	1.86	-1.6	0.0085
E10	841207	860423	3.6	-5.55	13	2.02	-13	1.7
G1	680820	900522	3.4	-0.126	9.8	2.67	-0.2	-0.049
G2	731105	900719	4.3	-0.0961	9.4	2.79	-0.24	0.043
G3	721018	900613	12	-0.0834	9.9	2.53	-0.16	-0.0079
G4	630611	900618	7.6	-0.0388	9.3	2.78	-0.096	0.019
G5	630612	900618	5	-0.064	10	2.35	-0.12	-0.011
G6	630611	900618	6.3	-0.0237	8.2	2.08	-0.068	0.02
G7	500705	901113	12	0.00338	8	2.39	-0.02	0.027
G8	500705	900402	2.4	0.0138	8.1	2.14	-0.037	0.064
G9	630606	900620	8.6	-0.0091	8	2.04	-0.05	0.032
G10	630611	900402	5.3	-0.0575	9.4	2.14	-0.17	0.052
G11	841127	900402	6.9	0.138	8.2	2.17	-0.3	0.57
G12	760719	900618	4.4	0.00245	8.4	2.1	-0.13	0.13
G13	500810	900618	3.7	-0.0047	7.8	2.46	-0.059	0.049
G14	500111	900507	3.5	0.014	7.7	2.36	-0.018	0.046
G15	630611	900618	6.4	0.11	5.2	2.11	0.069	0.15
G16	680716	900402	4.3	-0.0273	9	2.27	-0.088	0.034
G17	841126	900223	3.1	-0.213	9.3	3.45	-1.6	1.2
G18	630514	901210	12	-0.0135	8.8	1.97	-0.044	0.017

Table 5-33
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
G19	630514	900312	2.3	0.0166	8.4	2.72	-0.061	0.094
G20	630606	900606	2.3	0.0187	8.1	2.52	-0.053	0.09
G22	630611	900711	4.9	-0.105	11	2.44	-0.2	-0.014
G23	750403	900226	7.9	-0.155	9.3	2.53	-0.26	-0.05
G24	650315	900618	10	-0.0568	9.8	2.36	-0.1	-0.0094
G25	761021	900223	9.8	-0.0208	8.6	2.57	-0.13	0.092
G26	760719	900606	20	0.0098	8.4	2.34	-0.066	0.085
G27	500510	900606	7.5	0.0373	6.8	2.09	0.0094	0.065
G28	760719	900606	7.3	-0.154	9.5	2.26	-0.36	0.049
G29	630514	900207	7.6	-0.0787	9.8	1.88	-0.13	-0.032
G30	500510	900606	6.4	0.0195	7.9	2.74	-0.017	0.056
G31	500510	900606	7.1	0.0325	7	2.14	-0.0057	0.071
G32	680716	901008	10	-0.0101	8.3	1.84	-0.047	0.027
G33	730511	900306	0.71	0.0807	7.1	1.92	-0.14	0.3
G34	630514	900417	1.4	0.0712	5.7	1.86	-0.0089	0.15
G35	690922	900809	9.4	-0.0348	8.8	1.71	-0.077	0.0069
G36	680716	720425	10	-0.224	7.6	1.41	-0.62	0.17
G37	820630	901113	3.8	-0.412	10	2.02	-0.71	-0.11
H1	580806	900711	11	0.0642	6	2.24	0.04	0.088
H2	730214	900711	3.9	0.0836	7.1	1.99	-0.02	0.19
H3	640601	890415	2.8	0.0402	7.4	2.87	-0.091	0.17
H4	730911	900828	4	-0.198	11	2.88	-0.34	-0.059
H5	730911	900711	5.3	0.0375	7.6	1.94	-0.047	0.12
H6	750418	880928	0.67	0.129	7.1	1.95	-0.19	0.45
H7	570903	900110	20	0.0341	5.2	2.68	0.011	0.057
H8	570903	900711	6.5	-0.0837	9.9	3.2	-0.12	-0.047
H9	870615	900319	1.4	0.256	5.9	0.583	-1	1.5
H10	570903	900711	18	0.0113	8.3	3.45	-0.021	0.044
H11	570903	900813	14	0.105	3.5	2.16	0.088	0.12
H12	570903	850227	7.4	0.00491	4.3	2.88	-0.035	0.045
H13	570903	900809	18	0.129	3.1	3.07	0.11	0.15
H14	580116	900825	8.3	0.0533	1.5	1.55	0.036	0.071
H15	671001	900813	12	0.104	1.3	1.72	0.065	0.14
H16	680820	901026	3	0.133	-0.1	0.83	0.1	0.16
H17	671001	900813	27	0.138	0.4	1.78	0.11	0.16
H18	730801	850227	6.7	-0.594	7.2	2.79	-0.77	-0.42
H19	680716	900711	15	0.163	0.49	2.2	0.12	0.2
H20	720111	900813	27	0.045	3.3	2.64	0.0014	0.089
M1	880128	900112	1.5	-0.392	9	0.297	-5.1	4.3
M3	750821	760331	28	1.25	6.9	0.68	-0.24	2.7

Table 5-33
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
S1	580203	900425	2.3	0.067	4.5	2.95	-0.0066	0.14
T1	751221	900627	14	-0.173	11	2.42	-0.28	-0.063
T2	680820	900216	9.2	-0.0259	9.3	2.48	-0.079	0.027
T3	751216	860206	1.3	4.4E-5	9.7	1.72	-0.3	0.3
T4	660419	900618	4.2	0.00418	8.6	2.37	-0.052	0.061
T5	680716	900809	6.8	-0.0461	9.8	2.55	-0.11	0.014
T6	760129	890605	4	-0.353	10	2.31	-0.51	-0.2
T7	851216	871208	1	1.52	7	0		
T8	750507	760519	57	0.91	8.9	1.72	-0.56	2.4
T9	690528	900828	10	0.00522	8.3	2.06	-0.053	0.063
T10	680402	900606	9.5	-0.0994	10	2.37	-0.15	-0.045
T11	660303	900809	4.8	-0.0467	9.1	2.02	-0.095	0.0013
T12	691202	890824	3.6	-0.0694	9.5	2.06	-0.17	0.028
T13	761208	841128	0.25	-0.351	8.8	0		
T14	751120	900524	3	-0.169	10	2.99	-0.41	0.072
T15	751211	900523	15	-0.233	11	2.42	-0.32	-0.14
T16	771003	890511	3.1	-0.2	11	2.92	-0.45	0.053
T17	790110	881115	0.71	-0.23	10	2.64	-1	0.56
T18	640716	830315	0.48	0.311	4.6	1.75	0.017	0.6
W1	690210	900620	12	-0.0687	8.8	2.25	-0.12	-0.015
W2	501012	900621	7.9	-0.0347	9	2.02	-0.078	0.0088
W3	680501	890501	2.1	-0.234	11	2.51	-0.38	-0.088
W4	680716	901213	9.7	-0.0126	8.2	1.83	-0.051	0.026
W5	731113	900501	4.9	0.0169	7.8	2.13	-0.074	0.11
W6	500414	900404	2.3	0.0487	6.4	1.71	0.014	0.083
W7	650317	901218	12	-0.0281	8.7	2.26	-0.078	0.022
W8	650317	901218	4.5	0.00891	8.2	1.94	-0.049	0.066
W9	650317	900618	7.1	-0.0446	8.8	1.9	-0.11	0.024
W10	650317	900919	13	-0.025	8.3	2.16	-0.065	0.015
W11	501011	900618	6.8	-0.0425	9.3	2.43	-0.1	0.018
W12	500601	900626	3.1	0.0185	7.3	3.05	-0.036	0.073
W13	650317	900618	2.7	-0.141	10	1.63	-0.23	-0.057
W14	500601	901213	3.6	0.0166	7.4	2.58	-0.025	0.058
W15	500809	901213	3.4	0.0152	7.7	1.84	-0.028	0.058
W16	500809	900815	12	0.0117	7.6	2.05	-0.015	0.039
W17	500914	900511	2.4	-0.0807	11	2.22	-0.15	-0.0093
W18	690730	900815	5.8	0.114	5.9	2.06	0.047	0.18
W19	680716	900213	4.8	0.0454	7.3	1.68	-0.0024	0.093
W20	771212	900626	2.7	-0.104	8.1	1.87	-0.29	0.082
W21	500809	901213	3	0.0336	6.5	2.22	-0.011	0.079

Table 5-34
Time Trend Analysis for Hydrographic Segments: WQDODEF
DO deficit within upper 0.5 m (1.5 ft)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcp @ start	SEE	lower	upper
C1	630402	900910	4.6	-0.0508	1.8	2.59	-0.13	0.026
C2	630418	901210	6.9	-0.0754	0.59	2.24	-0.13	-0.021
C3	630418	900214	0.15	-0.0683	3.5	0.428	-0.17	0.037
C4	850717	890424	1.1	0.0202	-0.71	0.692	-1.5	1.5
C5	690730	901210	12	-0.0663	0.83	1.8	-0.11	-0.026
C6	671001	900627	2.4	-0.017	0.82	2.07	-0.18	0.15
D1	680715	900710	5.5	0.112	0.44	2.51	0.033	0.19
D2	640316	900710	4.7	0.00513	-0.44	2.12	-0.059	0.069
D3	630514	900626	3.1	0.0578	-1.4	2.35	-0.047	0.16
D4	500831	900428	5	0.00836	-0.46	2.21	-0.034	0.051
D5	500831	900428	1.1	-0.00234	-0.59	2.52	-0.077	0.072
E1	500928	900606	15	0.026	-1.1	1.83	-0.0075	0.06
E2	680716	901008	26	0.0232	-0.32	1.67	-0.002	0.049
E3	690422	900611	5.6	0.069	-1.3	1.83	-0.012	0.15
E4	690422	900612	7.8	0.0838	-1.1	2.18	0.011	0.16
E5	690422	900612	2	-0.0439	0.92	1.79	-0.16	0.068
E6	790820	900423	1.7	0.0419	-0.81	2.98	-0.46	0.55
E8	850610	900611	1	0.0405	1.9	0.56	-0.42	0.5
E9	850409	900523	2.1	0.683	-1.9	1.45	0.075	1.3
E10	841207	860423	3.6	3.65	-2.4	1.07	-0.18	7.5
G1	680820	900522	3.4	0.12	-1.5	2.5	0.048	0.19
G2	850603	900111	1.7	-0.488	1.3	2.73	-2	0.99
G3	721018	900613	12	0.0373	-1.1	2.2	-0.028	0.1
G4	630723	900618	7.4	0.0358	-1	2.49	-0.019	0.091
G5	680716	900618	6.1	0.0651	-1.5	2.08	0.017	0.11
G6	680716	900618	7.7	0.0254	-0.14	1.8	-0.014	0.064
G7	500705	900620	9.7	-0.00322	0.31	1.81	-0.024	0.017
G8	500705	900402	2.4	0.00831	-0.71	1.85	-0.035	0.052
G9	630606	900620	8.6	0.0146	-0.24	1.53	-0.017	0.046
G10	761118	900402	10	0.0476	-0.28	1.82	-0.068	0.16
G11	841127	900402	6.9	0.00831	-0.028	1.91	-0.37	0.39
G12	760719	900618	4.3	-0.0219	-0.04	1.51	-0.11	0.07
G13	500810	900618	3.6	0.0179	0.016	2.29	-0.034	0.07
G14	500111	900507	3.2	0.0101	-0.16	2.05	-0.022	0.042
G15	630611	900618	6.4	-0.0949	2.6	1.96	-0.13	-0.057
G16	680716	900402	4.3	0.0125	-0.7	2	-0.041	0.066

Table 5-34
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
G17	841126	900223	3.1	0.345	-1.2	3.43	-1	1.7
G18	630514	900522	6.5	0.00697	-0.48	1.69	-0.026	0.04
G19	630514	900312	1.8	0.00695	-0.41	2.33	-0.077	0.091
G20	630606	900606	2.1	-0.0213	0.061	2.17	-0.085	0.043
G21	860321	860724	8.8	1.69	-1.6	0.784	-60	63
G22	630611	900711	4.9	0.0595	-1.6	2.57	-0.035	0.15
G23	750403	900226	7.9	0.109	-0.58	2.31	0.013	0.2
G24	650315	900618	9.9	0.0583	-1.4	1.91	0.019	0.097
G25	761021	900223	9.8	0.00249	-0.0059	2.11	-0.09	0.095
G26	760719	900606	19	-0.0153	0.084	2	-0.08	0.049
G27	500628	900606	7.3	-0.00567	0.36	1.72	-0.032	0.02
G28	760719	900606	7.2	0.156	-1.5	1.77	-0.0029	0.32
G29	630514	900207	7.4	0.0826	-2.1	1.67	0.037	0.13
G30	500510	900606	6.2	-0.00291	0.12	2.31	-0.036	0.03
G31	500712	900606	7	-0.00903	0.32	1.8	-0.048	0.03
G32	680716	900606	7.7	-0.00134	0.14	1.65	-0.039	0.036
G33	730511	900306	0.71	-0.0803	0.44	1.83	-0.29	0.13
G34	630514	900417	1.2	-0.0259	1	1.5	-0.11	0.055
G35	750821	900516	2.9	0.0224	-0.47	0.981	-0.034	0.079
G36	680716	720425	10	-0.0854	0.56	0.685	-0.29	0.11
G37	840104	840104	1					
G38	890426	890427	730					
H1	580806	900711	9.7	-0.0637	2.3	1.99	-0.088	-0.04
H3	730911	890415	4.4	0.0176	-0.26	2.86	-0.13	0.16
H4	730911	900828	4	0.183	-2.5	2.64	0.055	0.31
H5	730911	900711	5.3	-0.0298	0.47	1.95	-0.12	0.056
H6	750418	880928	0.67	-0.188	1.1	1.59	-0.45	0.073
H7	571003	900110	10	-0.0511	2.8	2.59	-0.078	-0.024
H8	571003	900711	5.1	0.0729	-1.3	3.18	0.032	0.11
H9	870615	900319	1.4	-0.367	2.8	0.652	-1.8	1.1
H10	571003	891211	11	-0.00045	-0.2	3.41	-0.039	0.039
H11	580130	900813	9.2	-0.131	5.2	1.74	-0.15	-0.11
H12	571205	850227	3.8	-0.0537	4.4	2.01	-0.087	-0.02
H13	571003	900711	9.8	-0.0981	6.2	1.81	-0.12	-0.079
H14	580130	900825	6.3	-0.0654	7	1.43	-0.085	-0.046
H15	671001	900813	11	-0.116	7.2	1.17	-0.14	-0.089
H16	680820	900126	3	-0.151	8.2	0.666	-0.18	-0.13

Table 5-34
(continued)

Segment	Analysis period		Avg obs /yr	Regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
H17	671001	900813	26	-0.149	8	1.4	-0.17	-0.13
H18	730801	850227	6.1	0.562	0.97	2.61	0.39	0.74
H19	680716	900711	15	-0.165	8	1.74	-0.2	-0.13
H20	720324	900813	27	-0.0979	5.8	2.08	-0.13	-0.062
M1	880128	900112	1.5	0.78	-0.82	0.246	-3.1	4.7
M3	750821	760331	28	1.82	-0.56	0.594	0.51	3.1
M4	880927	880927	1					
M6	830509	830510	730					
S1	580206	900425	1.9	-0.104	4.5	2.49	-0.17	-0.036
T1	751221	900627	14	0.123	-1.4	2.07	0.029	0.22
T2	680820	900216	9.2	0.0189	-0.66	2.2	-0.028	0.066
T3	721018	900809	6.4	-0.0028	-0.24	1.33	-0.054	0.048
T4	760719	900618	6	-0.0207	0.077	2.28	-0.19	0.14
T5	680716	900809	6.8	0.0535	-1.3	2	0.0065	0.1
T6	680820	890705	6.9	0.0812	-0.57	1.99	0.03	0.13
T7	851216	871208	1	-2.46	4	0		
T8	750507	760519	57	0.389	-0.17	2.18	-1.5	2.3
T9	690528	900828	9.9	0.00159	0.64	1.64	-0.045	0.048
T10	680402	900606	9.5	0.101	-1.7	2.09	0.05	0.15
T11	680716	900809	9.9	0.0229	-0.057	1.41	-0.0043	0.05
T12	691202	890824	5.1	0.0255	-0.076	1.55	-0.044	0.095
T13	701118	850826	0.74	0.131	-0.4	1.17	-0.071	0.33
T14	751120	900524	3.7	0.147	-1.9	2.85	-0.068	0.36
T15	751211	900523	14	0.135	-1.6	2.28	0.05	0.22
T16	771003	890511	3.3	0.107	-2.1	3.07	-0.16	0.37
T17	790110	881115	0.41	0.00291	-0.5	2.8	-2.1	2.1
T18	640716	790110	0.21	-0.282	4	0.0408	-0.36	-0.21
W1	690210	900620	11	0.038	-0.96	2.26	-0.032	0.11
W2	501012	900618	6.3	0.046	-1.9	1.92	-0.00088	0.093
W3	680501	890501	2.1	0.205	-2.7	2.44	0.063	0.35
W4	680716	901213	9.7	-0.0212	-0.17	1.52	-0.053	0.011
W5	731113	900501	4.9	-0.0343	-0.066	1.71	-0.11	0.038
W6	500919	900404	2.3	-0.0478	1.3	1.8	-0.086	-0.01
W7	650317	900514	9.4	0.0321	-0.86	2.28	-0.036	0.1
W8	650317	901218	4.5	-0.0282	0.45	1.88	-0.084	0.028
W9	760916	900618	16	0.0041	-0.68	2.08	-0.07	0.078
W10	650317	900919	11	0.017	-0.28	1.6	-0.014	0.048

Table 5-34
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
W11	501011	900618	6.7	0.028	-1.2	2.22	-0.029	0.085
W12	500707	900626	2.9	-0.0089	0.47	3.06	-0.069	0.051
W13	650317	900618	2.7	0.0877	-1.7	1.51	0.0096	0.17
W14	500707	901213	3.6	-0.0113	0.29	2.2	-0.048	0.026
W15	500809	901213	3.4	-0.029	0.39	1.59	-0.066	0.0081
W16	500809	900516	8	-0.0411	0.97	2	-0.069	-0.013
W17	500914	900511	2.4	0.0518	-2.3	2.02	-0.013	0.12
W18	780501	891020	0.7	0.171	-2	2.33	-0.37	0.71
W19	680716	890613	3	-0.0429	0.73	1.3	-0.083	-0.0033
W20	771212	900626	2.8	-0.0188	0.26	1.84	-0.2	0.16
W21	500809	901213	1.4	-0.0185	0.15	2.09	-0.063	0.026

Table 5-35
Time Trend Analysis for Hydrographic Segments:
WQTCOLI log-transformed

Segment	<u>Analysis period</u>		Avg obs /yr	Base-e Logarithmic regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
C1	630402	851009	19	0.0357	7.3	1.65	0.011	0.061
C2	630312	851021	22	0.0483	6.2	1.84	0.024	0.073
C3	630418	810224	4.2	-0.0335	6.4	1.9	-0.13	0.065
C5	630313	851021	12	0.147	5.4	1.86	0.11	0.18
D1	640217	830726	10	-0.0408	8.2	1.5	-0.075	-0.0068
D2	630605	820622	4.9	0.11	5.5	1.96	0.04	0.18
D3	630605	810316	2.8	-0.0151	4.4	1.8	-0.1	0.07
D4	500831	830504	4.7	-0.0312	5.5	2.62	-0.12	0.061
D5	501004	801217	1.7	-0.164	8.2	1.86	-0.27	-0.054
E1	500309	810310	7.5	0.00295	2	1.4	-0.03	0.035
E2	580310	850909	11	0.0403	2	1.62	0.0079	0.073
E3	580310	800528	3.4	0.00781	3.3	1.87	-0.067	0.083
E4	580310	800528	7.2	-0.0086	3.5	1.94	-0.058	0.041
E5	580310	730118	1.6	0.0759	4.2	1.58	-0.033	0.18
G1	630508	810427	7.2	0.0134	4.4	2.03	-0.07	0.096
G2	731105	850213	2.1	-0.223	6.8	2.21	-0.55	0.1
G3	580224	850617	5.3	0.0568	3.2	1.88	0.014	0.099
G4	630313	810427	13	0.00091	4.8	2.15	-0.062	0.064
G5	580224	810427	7.9	-0.0224	3.6	2.03	-0.071	0.026
G6	580224	841212	5.4	0.115	2.6	2.2	0.043	0.19
G7	500227	841129	16	-0.0309	3.2	1.92	-0.055	-0.0071
G8	500317	810401	2	-0.103	4.8	1.74	-0.16	-0.044
G9	630612	740815	8.9	-0.1	4	2.09	-0.25	0.049
G10	630313	810427	7.2	0.00205	3.9	1.82	-0.059	0.063
G11	580224	580603	29	11.1	3	2	-11	33
G13	511126	810427	13	0.0101	3.3	1.88	-0.024	0.044
G14	500510	810316	3.1	-0.0166	3.1	1.8	-0.072	0.038
G15	580224	850617	9	0.0156	4.8	2.2	-0.038	0.069
G16	680716	850430	6.6	-0.0344	4.7	1.94	-0.12	0.055
G17	680116	810427	1.7	-0.0667	3.3	1.6	-0.25	0.12
G18	630313	850430	18	0.0626	2.9	1.78	0.028	0.097
G19	580312	810316	12	-0.0121	2.9	1.59	-0.047	0.023
G20	630612	810310	12	-0.0808	4.1	1.9	-0.15	-0.0098
G22	630521	850708	3.7	0.0541	4.7	2.09	-0.018	0.13
G23	630717	810427	8.2	-0.0255	4.1	1.99	-0.09	0.039
G24	580224	850430	6.5	-0.0019	3.3	2.07	-0.052	0.048
G26	580312	580611	85	11.7	2.1	2.32	-1.2	25

Table 5-35
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	Base-e Logarithmic regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
G27	500306	520320	3.9	-0.434	4.5	0.754	-1.6	0.75
G28	580310	580611	120	1.81	3.3	1.57	-4.8	8.4
G29	580310	810310	15	-0.0663	3	1.63	-0.096	-0.037
G30	500306	810310	8.4	0.0379	1.9	1.57	0.0045	0.071
G31	500309	580609	1.6	-0.389	5.7	1.55	-0.65	-0.13
G32	580310	830823	3.5	0.0394	2	1.34	-0.0034	0.082
G34	580310	810401	6.1	-0.0748	3.7	1.7	-0.13	-0.024
G36	680716	720425	25	-0.434	4.5	2.09	-0.88	0.01
G37	820427	850509	2.6	0.133	3.9	1.2	-1	1.3
H1	630312	850708	14	0.0759	5.3	1.81	0.045	0.11
H2	730214	850708	2.7	0.0492	6.2	1.96	-0.13	0.23
H3	630820	790516	3.4	0.0869	5.8	1.73	-0.0051	0.18
H4	730911	850411	2.3	-0.068	7.6	2.28	-0.4	0.26
H5	730911	850708	3.2	-0.0429	7.3	2.06	-0.23	0.15
H7	630715	720516	21	0.133	6.9	2.26	-0.01	0.28
H8	730911	851018	3.5	-0.154	8.4	1.79	-0.31	-0.0028
H10	730911	851018	3.1	0.00122	7.1	1.89	-0.17	0.17
H11	630805	850708	14	-0.0668	9.2	2.06	-0.11	-0.028
H12	630715	720516	5.2	0.14	9.1	1.91	-0.24	0.52
H13	630805	851018	7.6	-0.0949	10	1.63	-0.13	-0.058
H14	680716	740423	40	-0.324	11	2.22	-0.57	-0.074
H15	720504	851018	10	-0.0993	11	1.7	-0.18	-0.022
H16	680716	701020	46	-0.497	12	2.14	-1.1	0.13
H17	680716	851018	22	-0.0893	13	1.9	-0.13	-0.053
H18	730801	800909	7	0.476	9	2.19	0.21	0.74
H19	680716	851018	16	-0.152	13	2.02	-0.2	-0.11
H20	751201	850813	23	-0.0999	12	2.05	-0.21	0.013
S1	680716	701020	47	-0.643	10	2.31	-1.3	0.04
T1	690820	810309	4	-0.0528	3	1.58	-0.21	0.1
T2	580311	850807	11	0.0184	3.4	2.18	-0.03	0.067
T3	710316	850516	3.8	0.0438	5.2	2.3	-0.11	0.19
T4	580226	810309	10	-0.0643	3.3	1.74	-0.11	-0.02
T5	580226	850516	6.8	0.00471	3.1	2.03	-0.045	0.054
T6	630729	810309	6.6	-0.106	5.6	2.01	-0.2	-0.014
T9	710914	830110	4.3	0.15	6.5	2.05	-0.06	0.36
T10	580311	810309	19	-0.0090	3	1.81	-0.042	0.024
T11	580226	850516	14	0.00701	3.7	2.12	-0.032	0.046
T12	691202	720502	14	-0.705	4.4	1.91	-1.6	0.17

Table 5-35
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	Base-e Logarithmic regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcp @ start	SEE	lower	upper
T15	580226	810406	2.1	0.0554	5.6	1.67	0.0039	0.11
T17	731015	810406	3.1	-0.144	8	0.829	-0.3	0.014
T18	731015	810406	5.8	-0.198	7.9	1.05	-0.33	-0.065
W1	680418	810317	6.1	-0.0294	1.7	1.47	-0.12	0.065
W2	501012	851022	2.4	0.101	0.64	2.17	0.0079	0.19
W3	680501	810317	1.8	-0.156	4.9	1.98	-0.39	0.074
W4	680716	850828	1.8	0.15	2.1	1.99	-0.042	0.34
W5	731113	800925	2.5	0.344	2.6	1.15	0.035	0.65
W6	500414	801203	7.5	-0.00018	2.5	1.93	-0.047	0.046
W7	630724	851022	6.9	0.0937	3.7	2.02	0.036	0.15
W8	631016	830825	4.3	0.0165	6.5	1.73	-0.055	0.088
W9	630724	801203	6.7	-0.0086	1.4	1.18	-0.051	0.033
W10	630724	851003	7.1	0.0623	1.4	1.67	0.015	0.11
W11	630724	801203	10	-0.0252	2.6	1.82	-0.078	0.027
W12	500320	890112	5.4	-0.0632	4.1	1.53	-0.1	-0.027
W13	630724	801203	3.2	0.0623	1.9	1.6	-0.021	0.15
W14	500614	850625	0.37	-0.0168	5	1.34	-0.11	0.08
W15	501006	850509	4.7	-0.0706	5.2	1.9	-0.12	-0.022
W16	511019	850624	14	-0.187	10	2.99	-0.25	-0.13
W17	580312	810401	2.4	-0.0794	3.4	1.74	-0.16	0.004
W18	630805	820630	4.9	0.0562	3.5	1.78	-0.014	0.13
W19	640709	781205	9.1	0.0209	2.6	1.54	-0.065	0.11
W21	500908	850923	8.8	-0.116	7.2	2.04	-0.17	-0.059

Table 5-36
Time Trend Analysis for Hydrographic Segments:
WQFCOLI log-transformed

Segment	<u>Analysis period</u>		Avg obs /yr	<u>Base-e Logarithmic regression on time</u>			<u>95% confidence limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
C1	730919	900910	11	-0.0603	5.8	1.88	-0.13	0.0047
C2	720524	901210	11	-0.0222	4.5	1.89	-0.082	0.038
C3	740409	860206	1.4	-0.0982	4.3	1.7	-0.35	0.15
C5	701030	900606	8.8	-0.0919	5.6	1.82	-0.15	-0.033
D1	701215	900409	7.9	0.0483	5.4	1.7	-0.011	0.11
D2	701021	900710	3.5	0.0151	4.7	1.79	-0.07	0.1
D3	701215	910813	7.8	0.00086	2.8	2.12	-0.069	0.07
D4	680923	900815	8.8	-0.073	3.5	2.07	-0.14	-0.0077
D5	680923	860123	3.6	-0.101	3.1	1.71	-0.21	0.0051
E1	701020	910729	18	-0.0173	1.4	0.935	-0.036	0.0016
E2	680716	910729	14	-0.0048	1.5	1.22	-0.027	0.018
E3	720524	910729	2.3	0.0103	2.2	1.91	-0.075	0.095
E4	720524	910729	5.5	-0.0036	2	1.66	-0.054	0.047
G1	680716	910813	5.2	-0.0664	3.5	1.95	-0.11	-0.023
G2	731105	900719	2.5	0.0661	2.8	1.39	-0.022	0.15
G3	690514	910813	5.7	-0.0542	2.9	1.53	-0.1	-0.0071
G4	680716	910813	11	-0.0155	3.6	2.02	-0.05	0.019
G5	680716	910813	13	-0.0102	2.1	1.63	-0.038	0.017
G6	680716	910813	9.5	-0.0266	3.5	1.98	-0.061	0.008
G7	680402	910813	38	-0.0011	1.5	1.34	-0.015	0.013
G8	740522	910228	2.8	0.0688	0.65	0.979	0.0053	0.13
G9	680716	740522	6.5	-0.589	3.9	1.72	-1.1	-0.095
G10	690514	910813	4.5	-0.0519	2.7	1.43	-0.1	-0.0042
G13	680402	910813	21	-0.0476	2.5	1.4	-0.067	-0.028
G14	680402	910813	9.7	-0.0081	1.8	1.52	-0.041	0.025
G15	680716	910813	12	-0.0872	4.1	1.98	-0.12	-0.059
G16	680716	900618	5.1	0.0142	2.8	1.62	-0.031	0.059
G17	720501	910813	6.4	-0.0232	2	1.16	-0.07	0.024
G18	680402	910813	17	-0.0178	2.1	1.36	-0.035	-0.00087
G19	680402	910813	23	-0.0231	1.7	1.1	-0.038	-0.008
G20	680402	910813	10	-0.0843	2.8	1.3	-0.1	-0.065
G22	690514	910717	5.1	-0.0802	4.3	1.86	-0.15	-0.012
G23	690514	910717	7.7	0.00102	2.2	1.66	-0.043	0.045
G24	680716	910717	7	-0.0148	2.1	1.58	-0.048	0.018
G26	860916	870127	5.5	4.71	0.69	0		
G29	680402	910729	16	0.00716	0.95	0.762	-0.0067	0.021

(continued)

Table 5-36
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	Base-e Logarithmic regression on time			95% confidence limits on slope	
	Start date	End date		slope per yr	intrcp @ start	SEE	lower	upper
G30	680402	990122	15	-0.0196	1.5	0.983	-0.033	-0.0063
G32	680716	891016	1.5	0.107	1.2	0.842	0.053	0.16
G34	720214	910729	6.3	-0.0514	1.8	0.894	-0.084	-0.019
G36	680716	720321	21	0.346	2.8	1.76	-0.13	0.82
G37	860617	900815	2.2	0.243	2.9	1.57	-0.77	1.3
H1	690514	910813	13	-0.0877	4.9	1.61	-0.12	-0.054
H2	730214	900711	2.6	0.0484	3.4	1.41	-0.037	0.13
H3	720516	790516	2.9	-0.574	5.1	1.08	-0.87	-0.28
H4	730911	900828	2.4	-0.0059	4.5	1.87	-0.11	0.098
H5	730911	900711	3.3	0.054	3.3	1.63	-0.031	0.14
H7	680716	720516	26	-0.0662	6.2	2.4	-0.72	0.59
H8	730911	900711	3.4	0.043	4	1.56	-0.042	0.13
H10	730911	900711	3	0.0953	3.6	1.61	0.005	0.19
H11	671001	900813	12	-0.171	7.8	1.99	-0.21	-0.14
H13	720504	900711	9.5	-0.0444	6.6	1.73	-0.093	0.0045
H14	680716	740423	39	-0.269	9.2	2.54	-0.56	0.024
H15	720504	900813	10	-0.0842	8.1	1.87	-0.14	-0.032
H16	680716	701020	47	-0.586	11	2.24	-1.2	0.073
H17	680716	900813	24	-0.185	11	2.09	-0.21	-0.16
H18	730801	800909	7	0.497	7.6	2.41	0.2	0.79
H19	680716	900711	14	-0.248	12	2.13	-0.28	-0.21
H20	751201	900813	23	-0.0768	9.2	2.05	-0.12	-0.033
S1	680716	701020	46	-0.273	8.4	2.72	-1.1	0.54
T1	691104	910717	4.2	-0.0394	1.9	1.14	-0.078	-0.0011
T2	681015	910717	11	-0.0816	2.6	1.31	-0.1	-0.058
T3	710427	900508	2	0.0114	3.4	1.65	-0.077	0.1
T4	680402	910717	12	-0.0131	1.3	0.901	-0.029	0.0027
T5	680716	910702	5.7	-0.0154	1.7	1.15	-0.042	0.011
T6	680820	910717	4.7	-0.0768	3.2	1.49	-0.11	-0.043
T9	710914	900828	4.4	-0.0518	5	1.52	-0.12	0.018
T10	680402	910717	18	-0.025	1.7	1.19	-0.042	-0.0085
T11	680716	910717	14	-0.0558	2.5	1.43	-0.078	-0.034
T12	691202	881213	1.5	0.0184	2.5	1.24	-0.058	0.095
T15	740306	880628	2.5	-0.188	5.5	1.81	-0.33	-0.046
T17	740306	831019	2.7	-0.16	6	1.29	-0.32	0.0034
T18	740306	880628	4	-0.123	5.8	1.23	-0.2	-0.043

(continued)

Table 5-36
(continued)

Segment	<u>Analysis period</u>		Avg obs /yr	Base-e Logarithmic <u>regression on time</u>			95% confidence <u>limits on slope</u>	
	Start date	End date		slope per yr	intrcpt @ start	SEE	lower	upper
W1	710623	910430	8	-0.0229	1.3	0.777	-0.044	-0.0015
W2	720614	910430	6.3	0.0245	2	1.91	-0.039	0.088
W3	720614	910430	2.2	-0.0678	3.2	1.91	-0.18	0.041
W4	680716	900621	0.78	0.0101	2.4	1.91	-0.12	0.14
W5	731113	760819	4.3	0.0879	2.1	0.176	-0.054	0.23
W6	680716	910424	9	0.051	1.5	1.96	0.011	0.091
W7	710623	901218	5.6	0.0702	2.6	1.96	-0.0067	0.15
W8	701021	901218	3.3	-0.027	5	2.01	-0.12	0.065
W9	710712	910424	6.6	0.0353	0.64	0.858	0.0046	0.066
W10	680716	910424	11	0.0147	1.1	1.02	-0.0067	0.036
W11	710712	910424	14	0.0339	1.4	1.33	0.00072	0.067
W12	730124	910424	23	0.068	1	1.35	0.039	0.097
W13	730124	910424	3.6	0.0629	1.7	1.41	-0.0071	0.13
W14	851218	900621	1.6	-0.406	4.7	1.63	-1.7	0.92
W15	710622	910424	11	0.0126	2.2	1.33	-0.02	0.045
W16	680716	910729	19	-0.243	6.4	2.65	-0.28	-0.21
W17	720508	910729	2.3	-0.0427	1.7	0.864	-0.1	0.014
W18	710622	910729	4.6	-0.0546	2.8	1.51	-0.11	0.0034
W19	680716	900213	3.3	0.0651	1.7	1.01	0.0065	0.12
W21	730508	900621	28	-0.0536	3.5	1.91	-0.094	-0.013

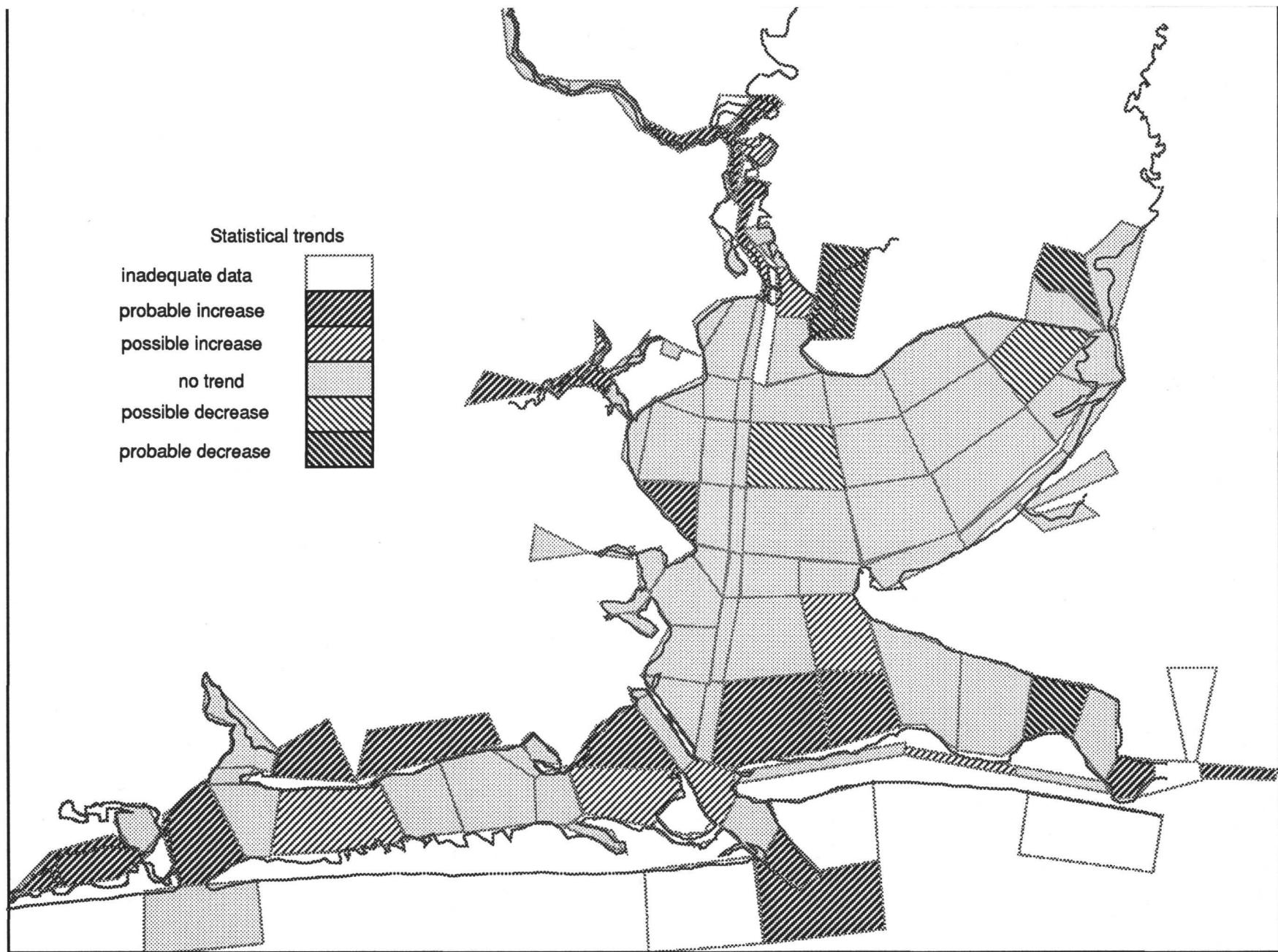


Fig. 5-24 Statistical trends over period of record of winter temperatures (WOTEMP) in Galveston Bay

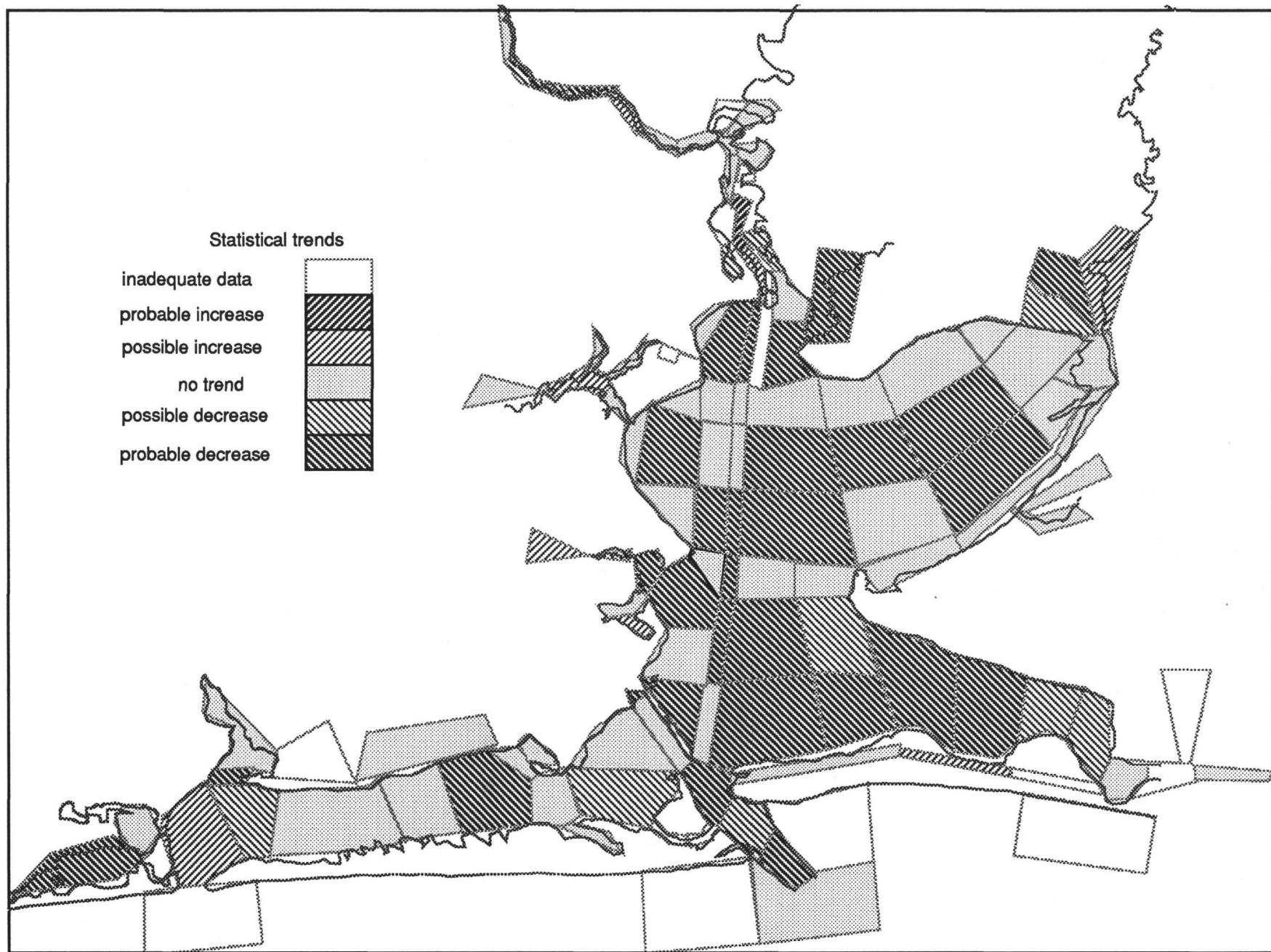


Fig. 5-25 Statistical trends of summer (July-August) temperatures (WQTEMP) in Galveston Bay

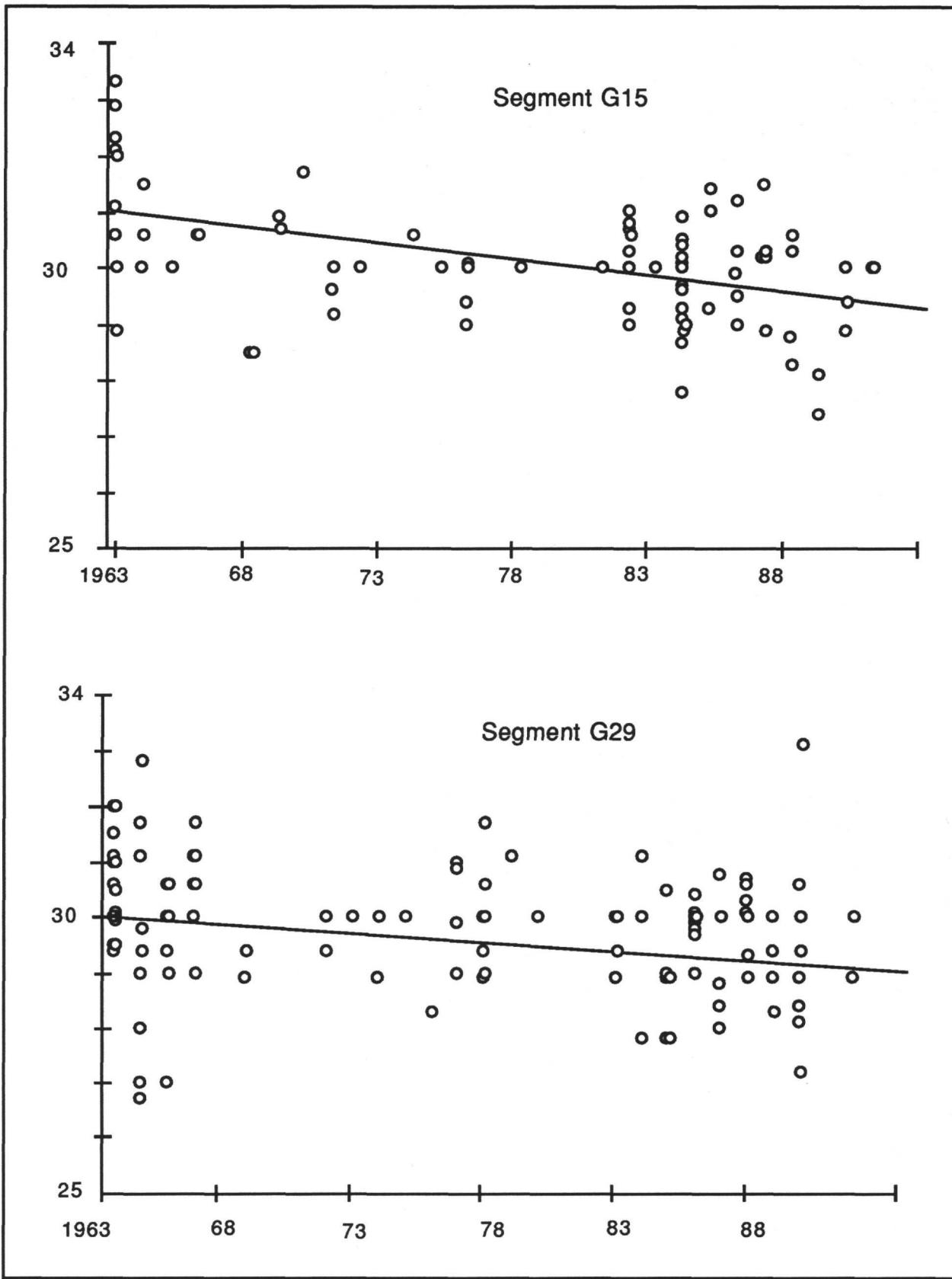


Fig. 5-26 Summer temperature trends at Segments G15 and G29

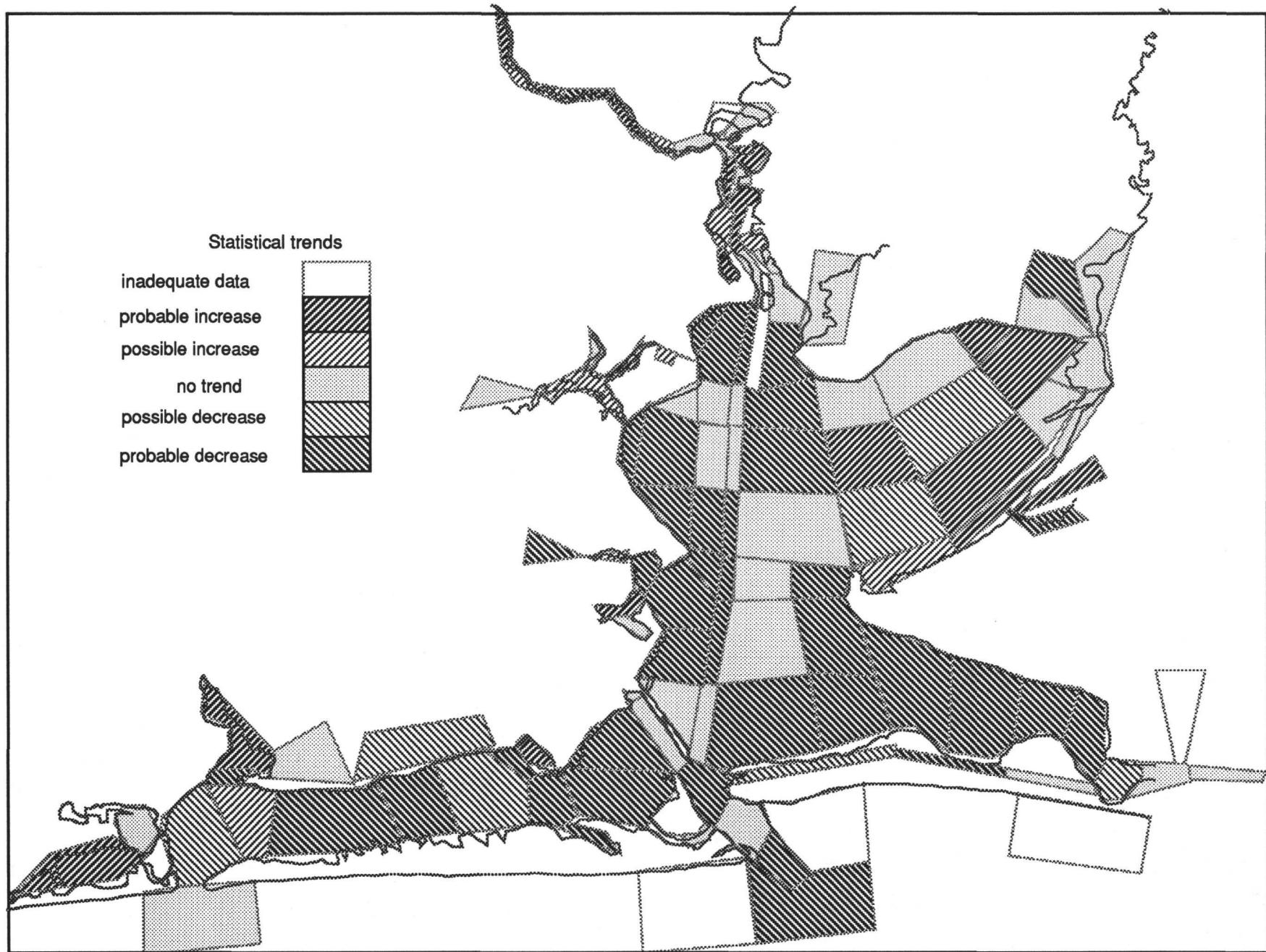


Fig. 5-27 Statistical trends of salinity (WQSAL) within upper 1.5 m in Galveston Bay

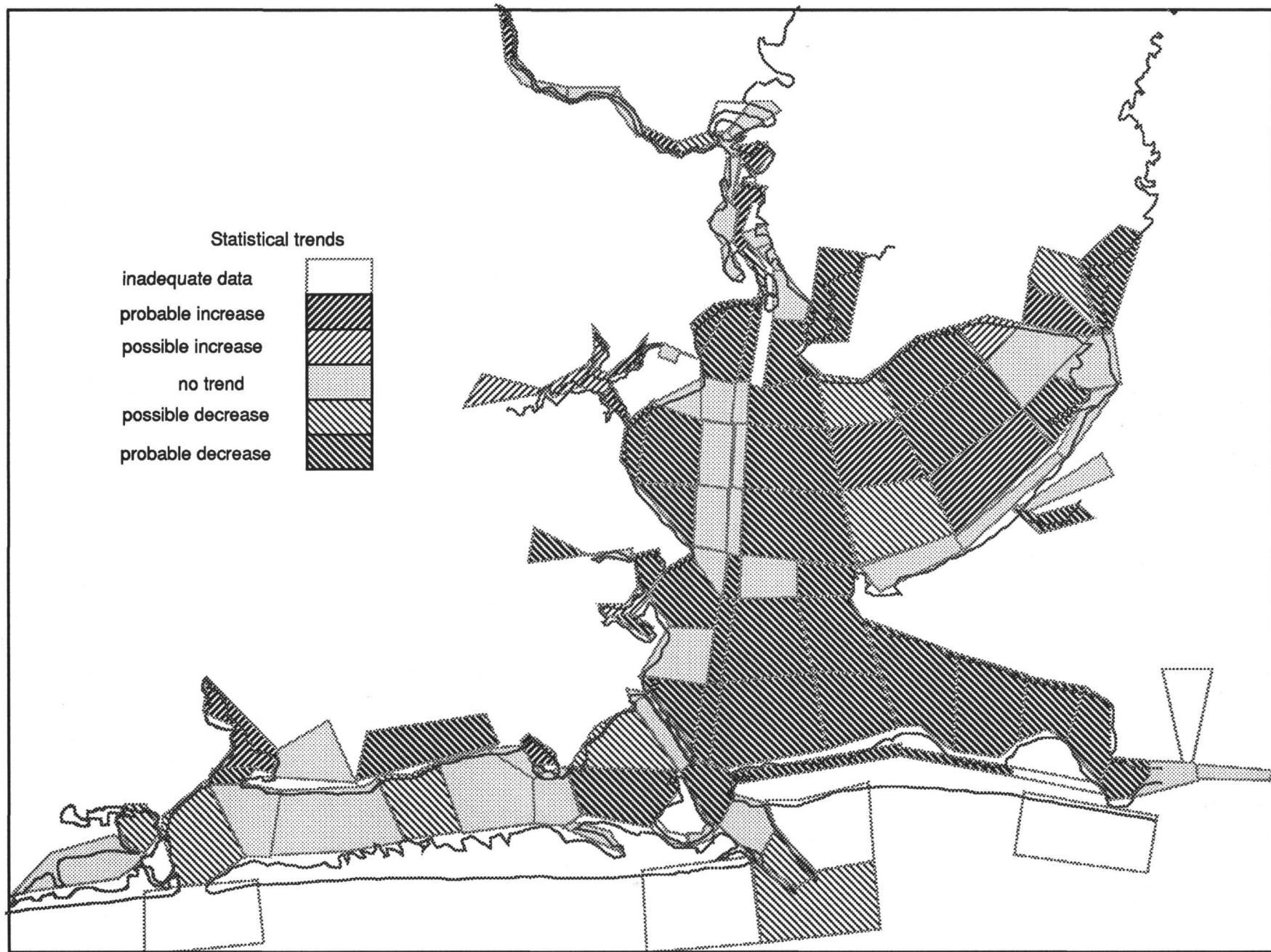


Fig. 5-28 Statistical trends of summer (JAS) salinity (WQSAL) in Galveston Bay

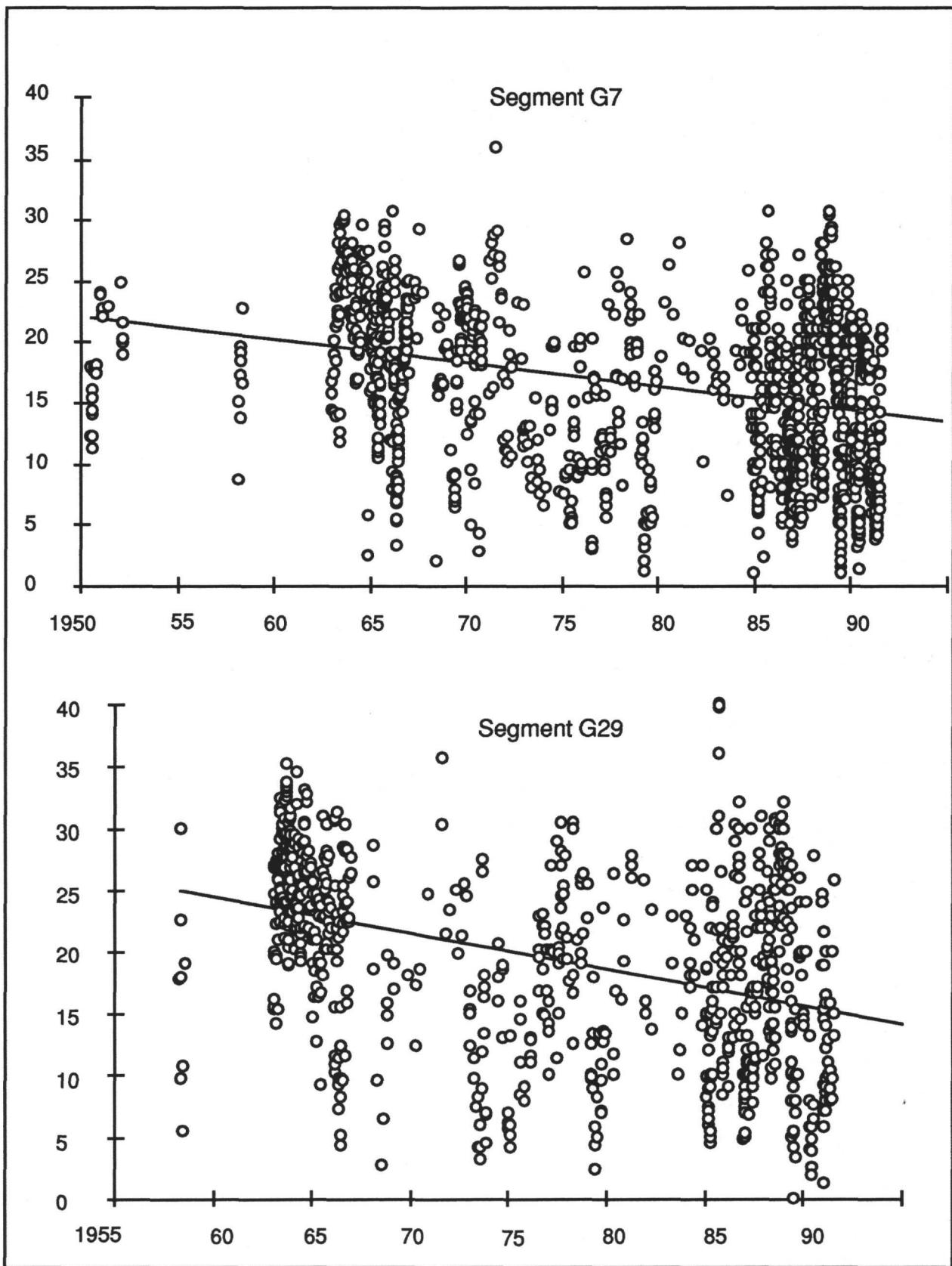


Fig. 5-29 Salinity within upper 1.5 m trends at Segments G7 and G29

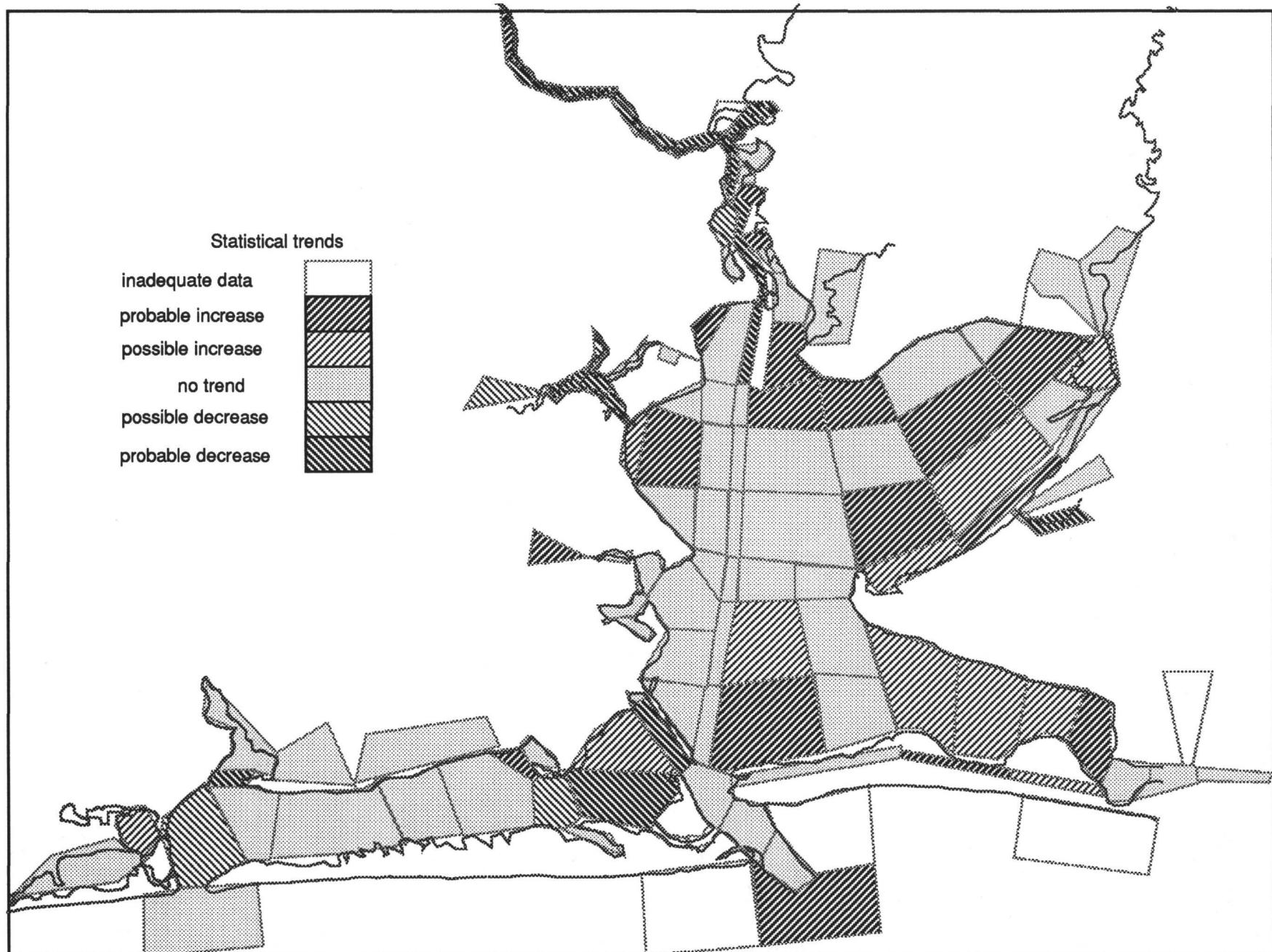


Fig. 5-30 Statistical trends over period of record of WQDODEF in upper 0.5 m in Galveston Bay

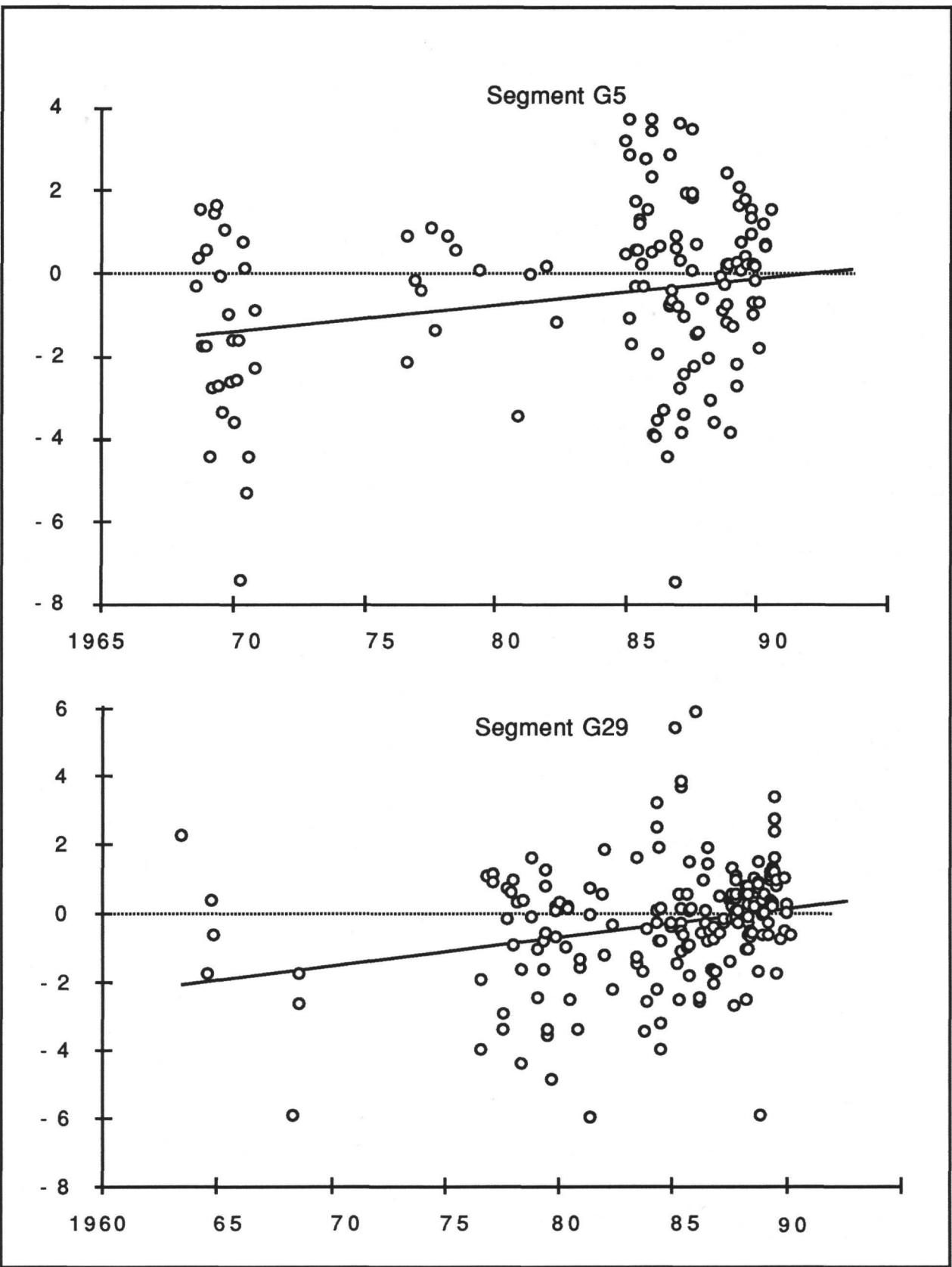


Fig. 5-31 WQDODEF (within upper 0.5 m) trends at open-bay Segments G5 and G29

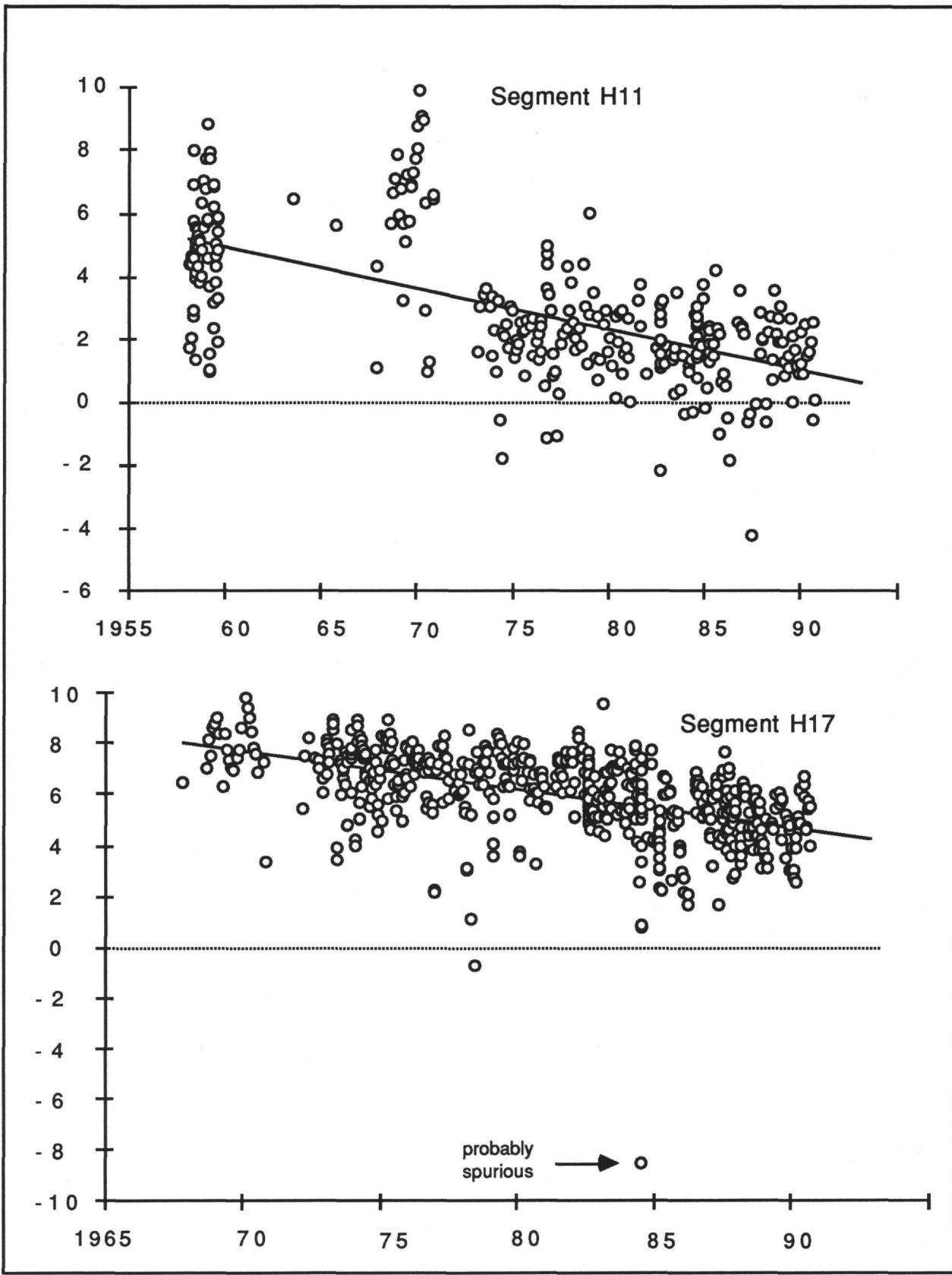


Fig. 5-32 WQDODEF (upper 0.5 m) trends in Houston Ship Channel (confined reach), Segments H11 and H17

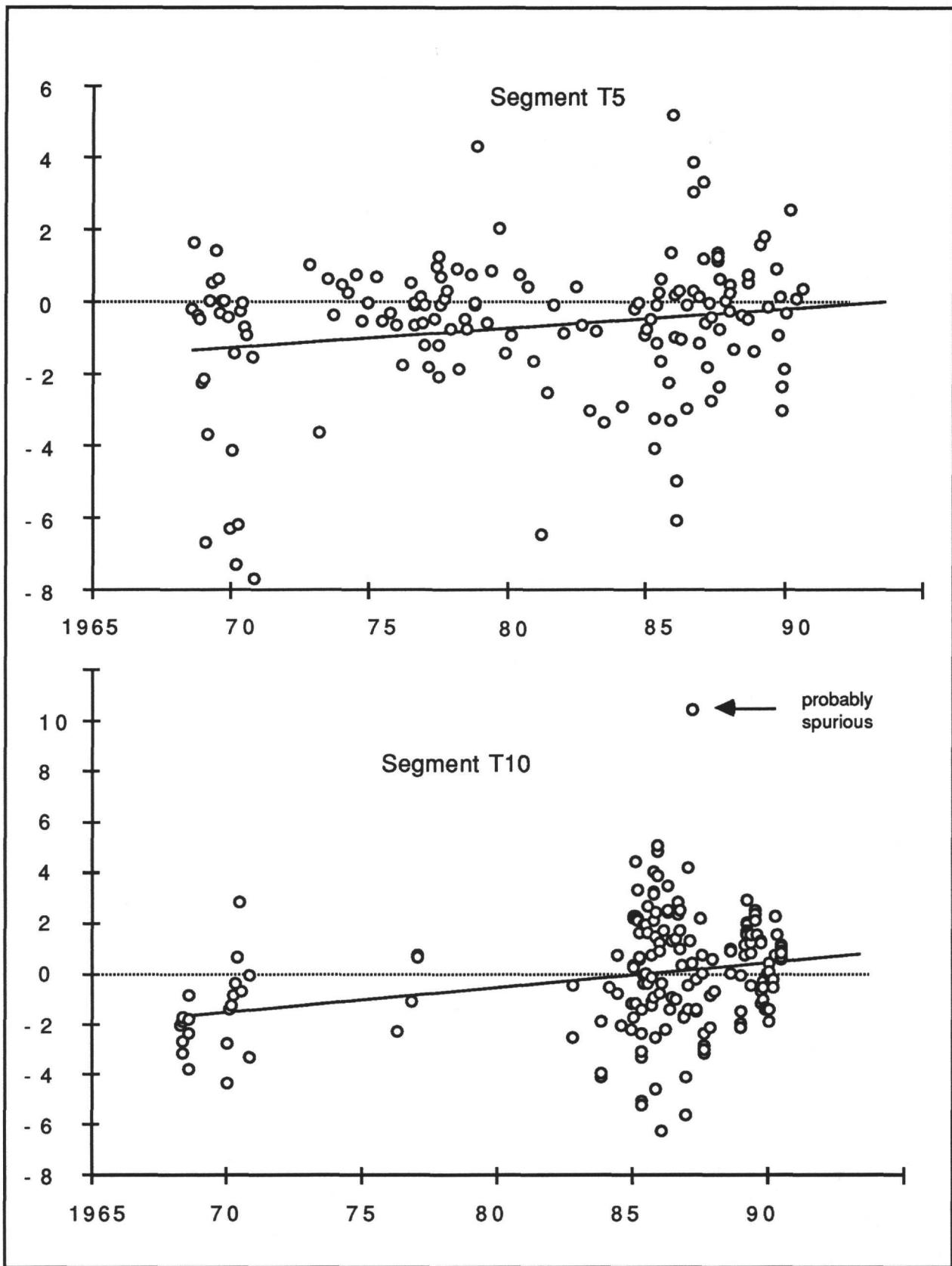


Fig. 5-33 WQDODEF (upper 0.5 m) trends in Trinity Bay, Segments T5 and T10

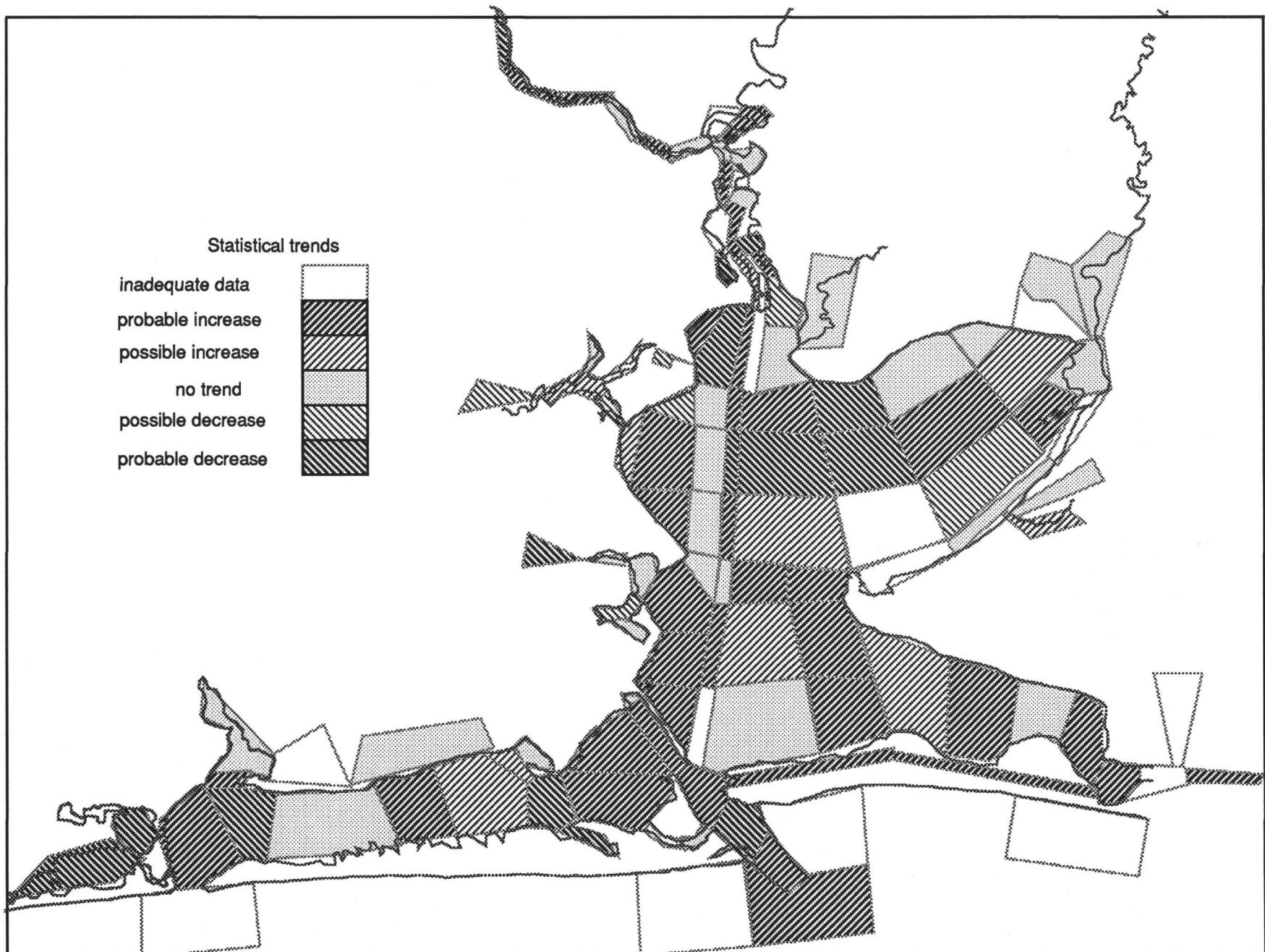


Fig. 5-34 Statistical trends over period of record of WQPH in Galveston Bay

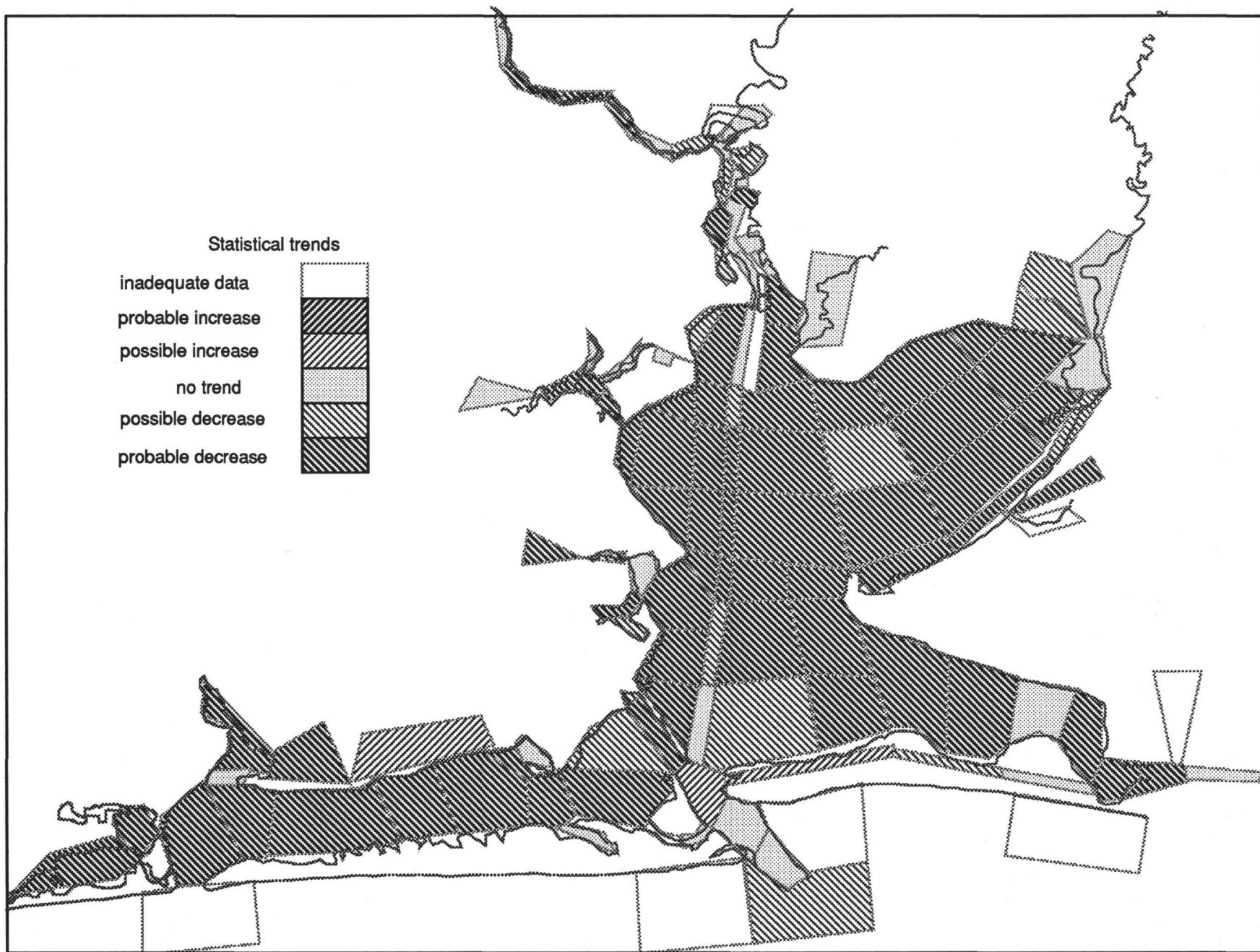


Fig. 5-35 Statistical trends over period of record of WQXTSS in Galveston Bay

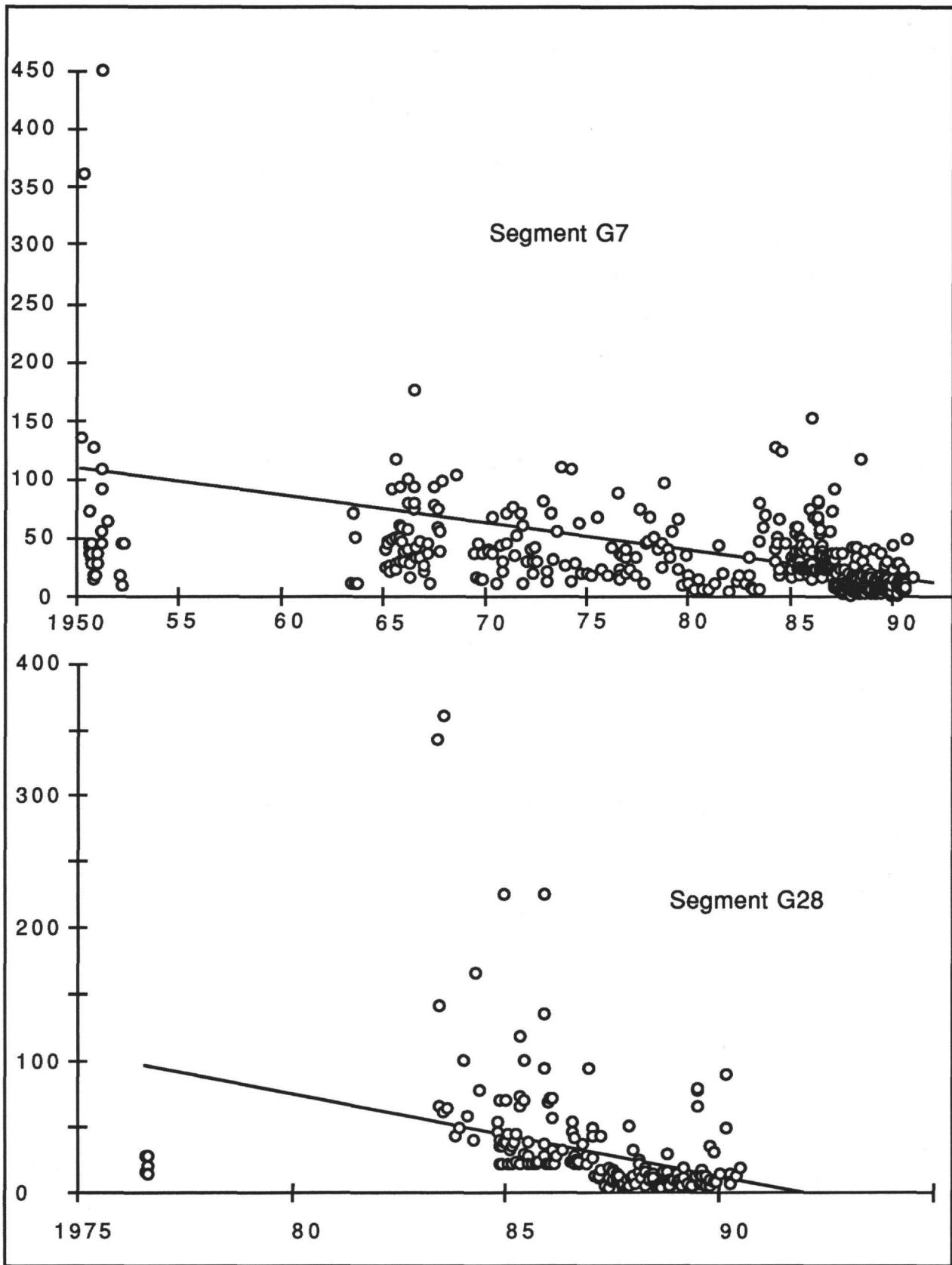


Fig. 5-36 WQXTSS trends in open bay, Segments G7 and G28

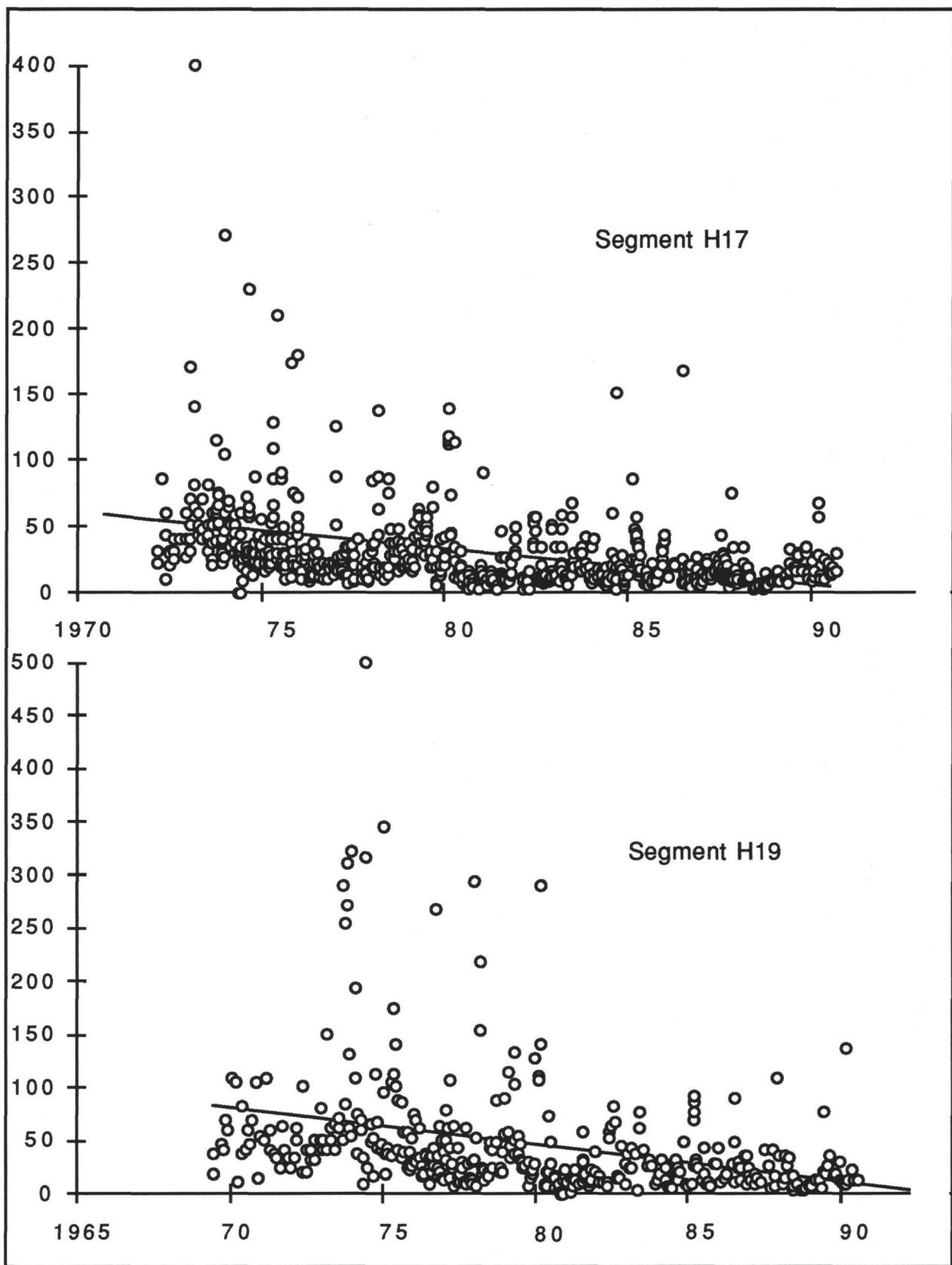


Fig. 5-37 WQXTSS trends in upper Houston Ship Channel, Segments H17 and H19

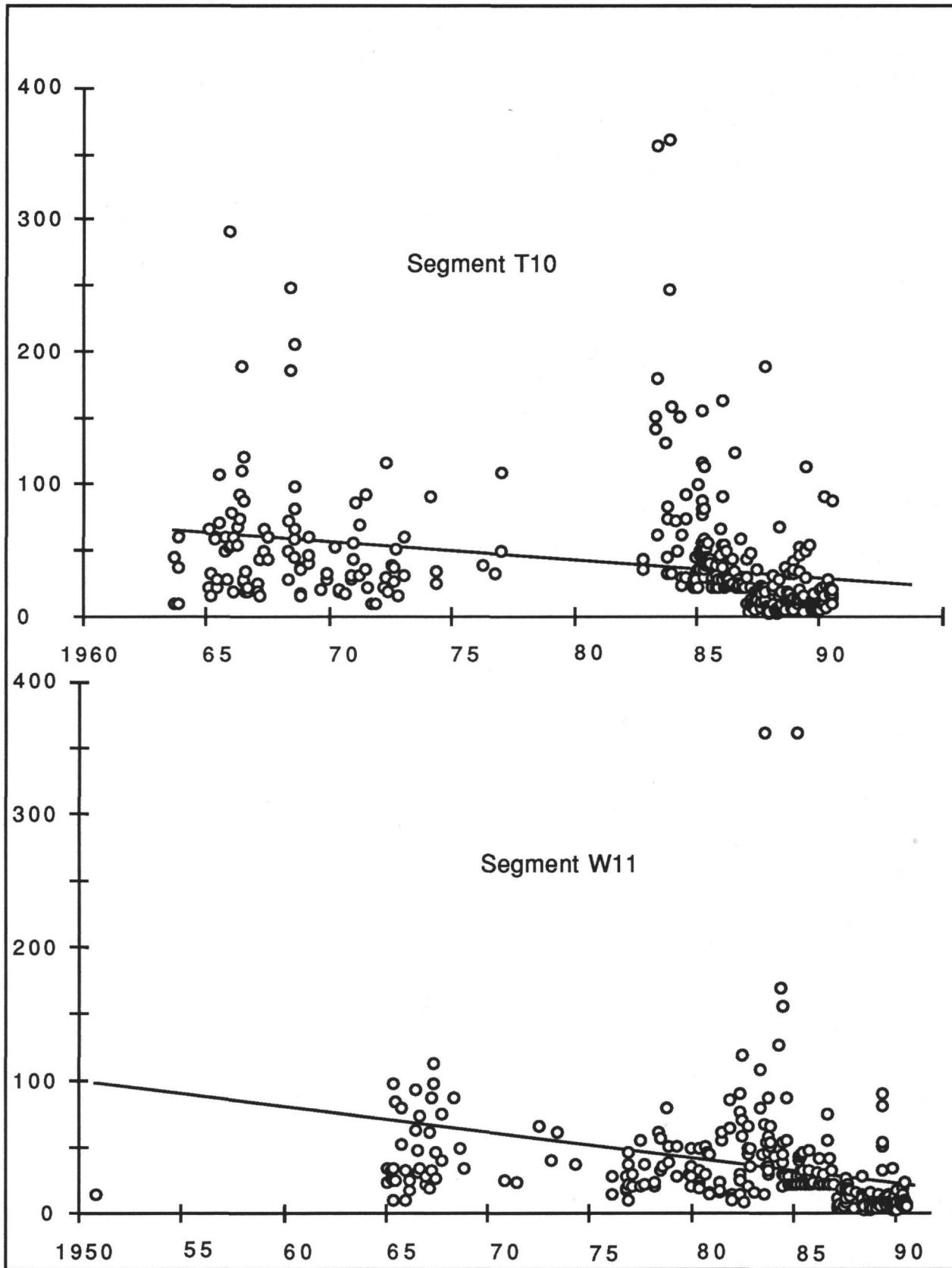


Fig. 5-38 WQXTSS trends in Trinity Bay (T10) and West Bay (W11)

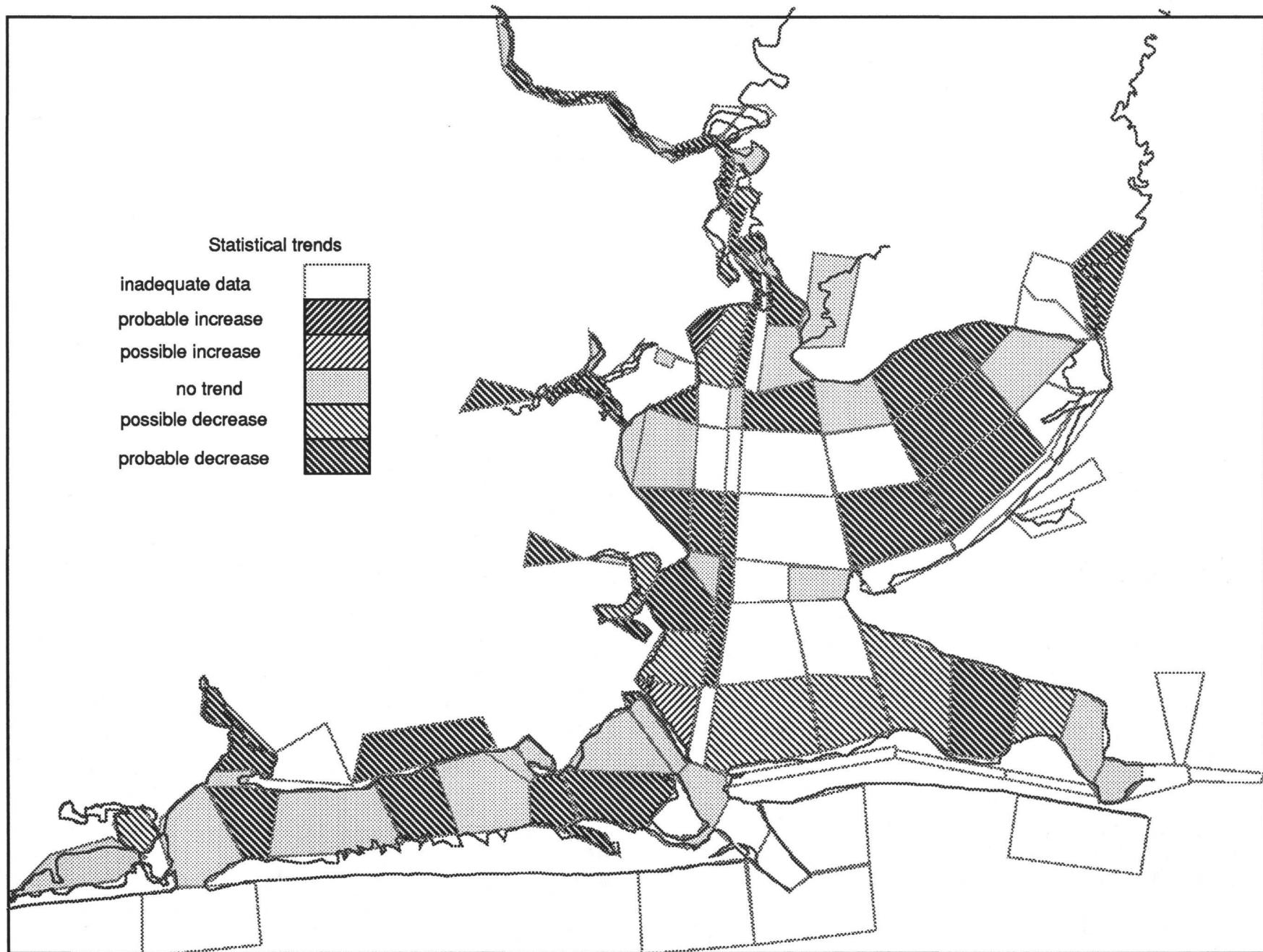


Fig. 5-39 Statistical trends over period of record of WQVSS in Galveston Bay

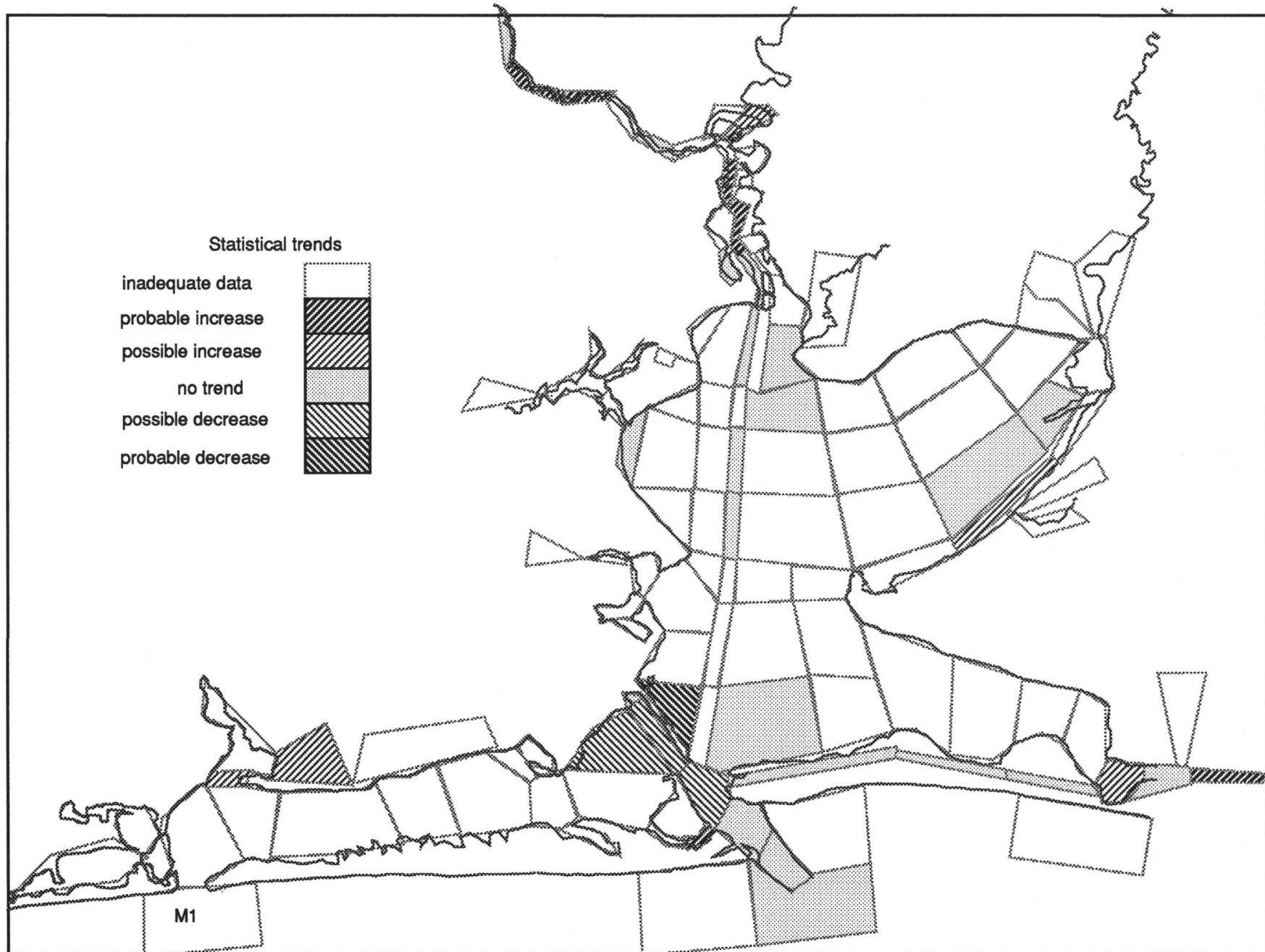


Fig. 5-40 Statistical trends over period of record of WQO&G in Galveston Bay

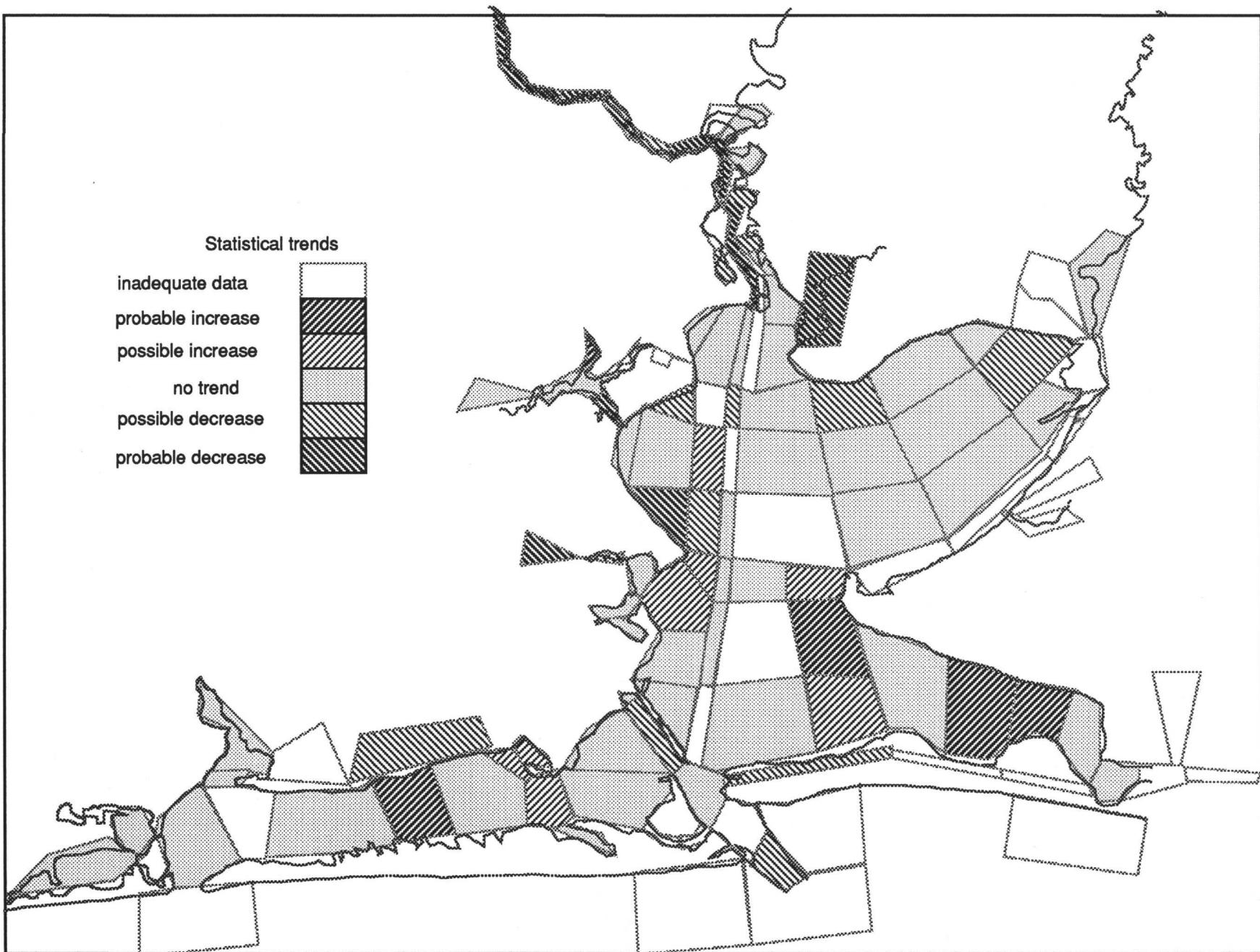


Fig. 5-41 Statistical trends over period of record of WQXBOD5 in Galveston Bay

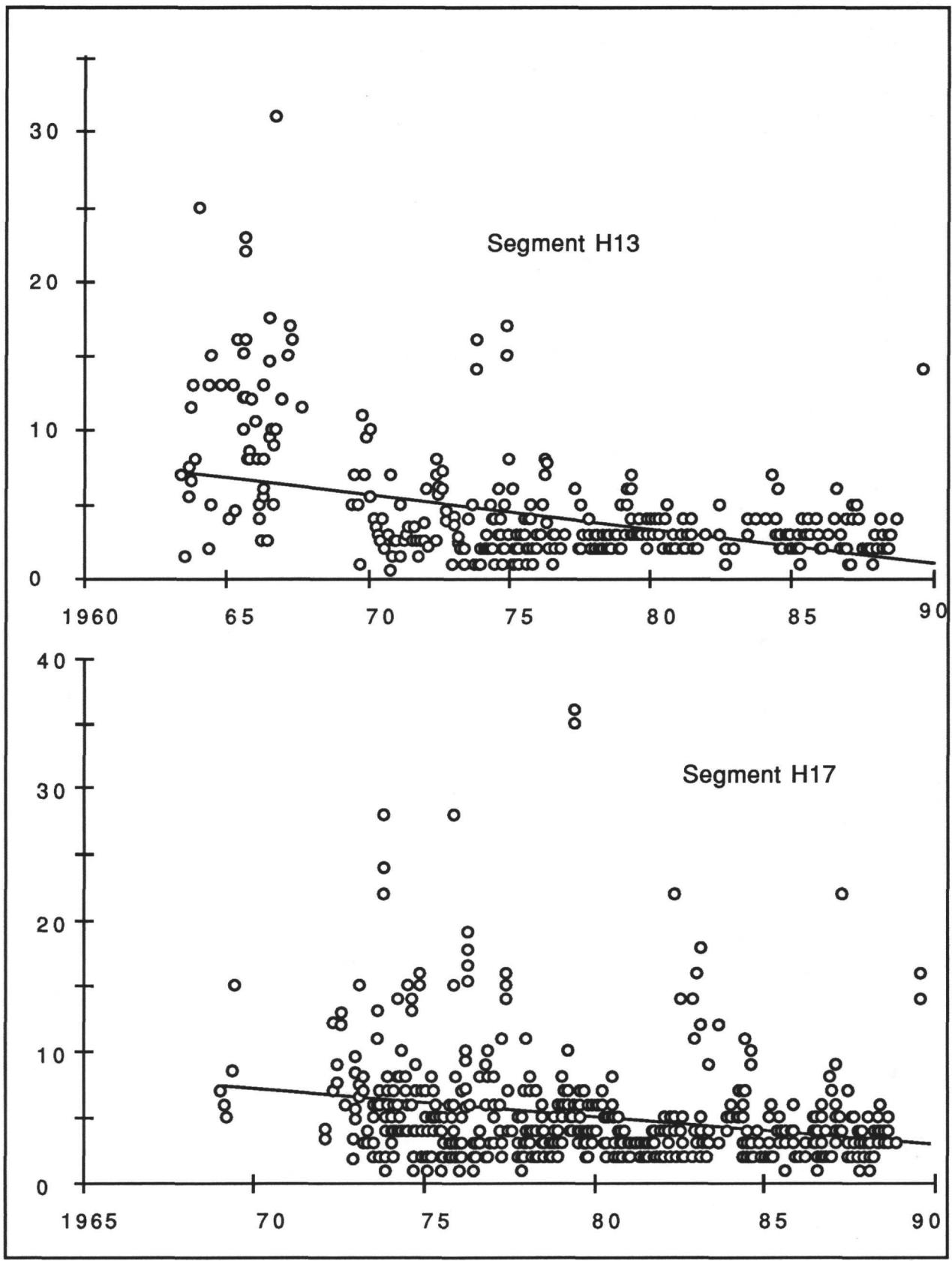


Fig. 5-42 WQXBOD5 trends in upper Houston Ship Channel, Segments H13 and H17

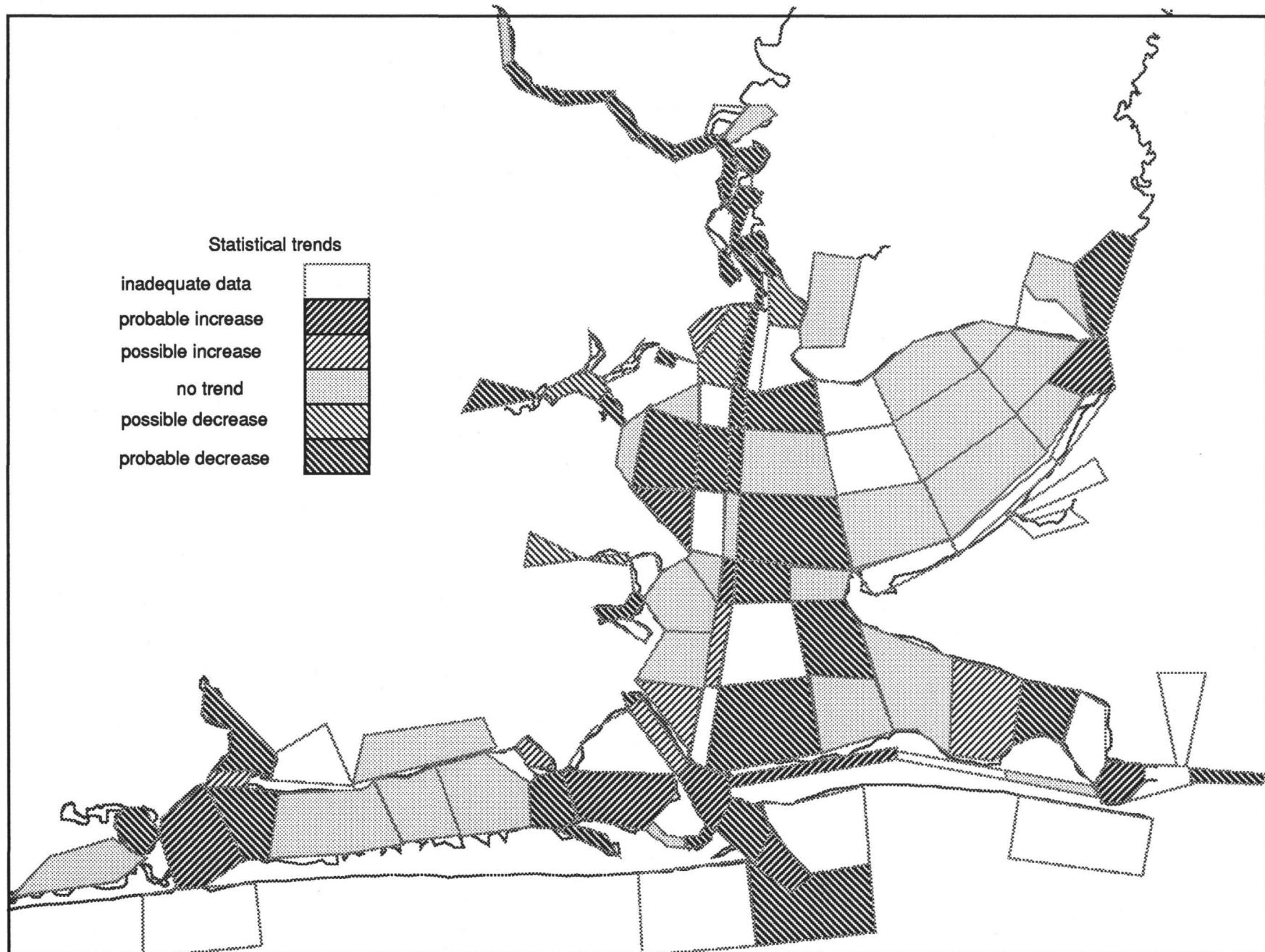


Fig. 5-43 Statistical trends over period of record of WQAMMN in Galveston Bay

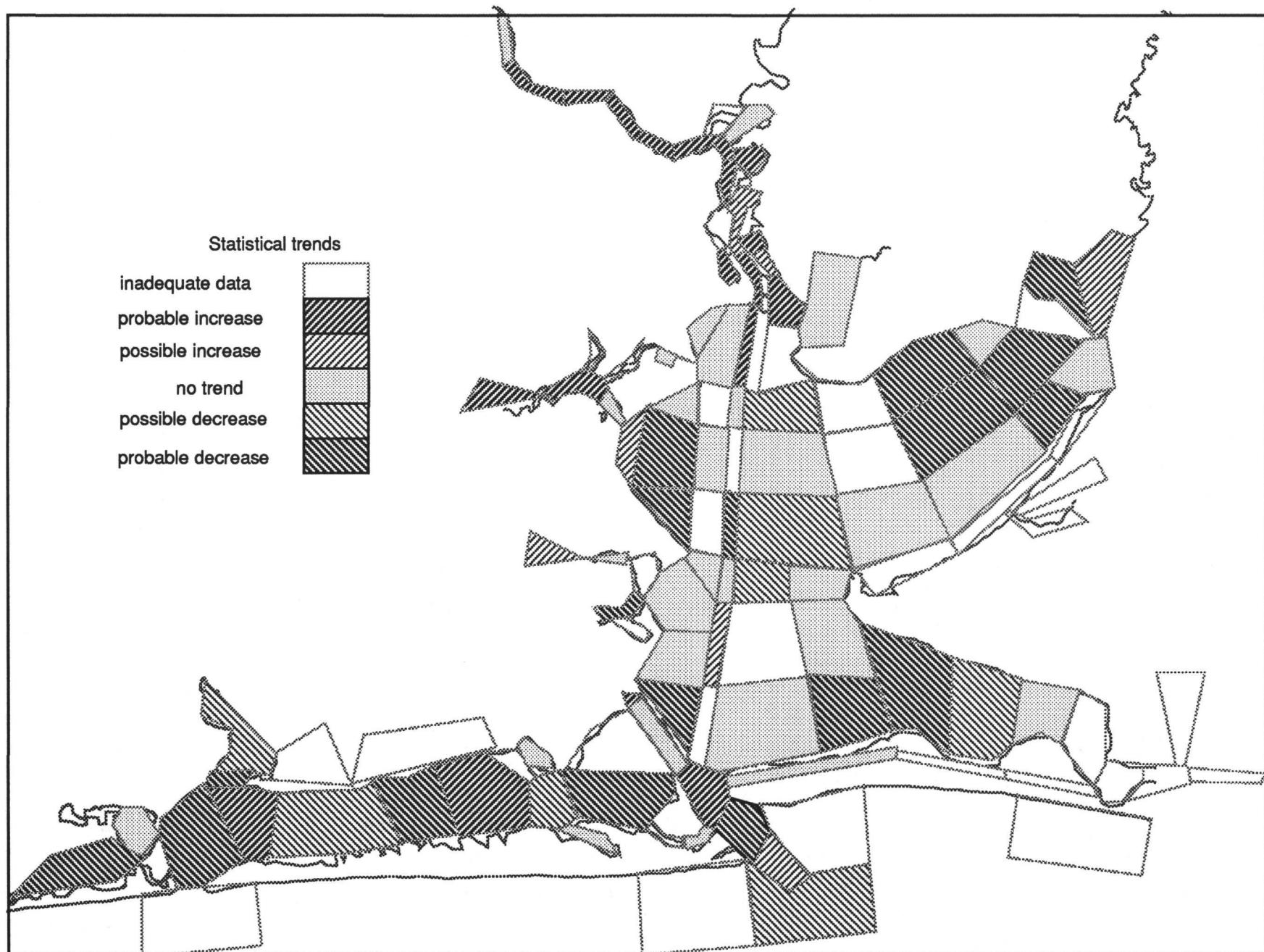


Fig. 5-44 Statistical trends over period of record of WQNO3N in Galveston Bay

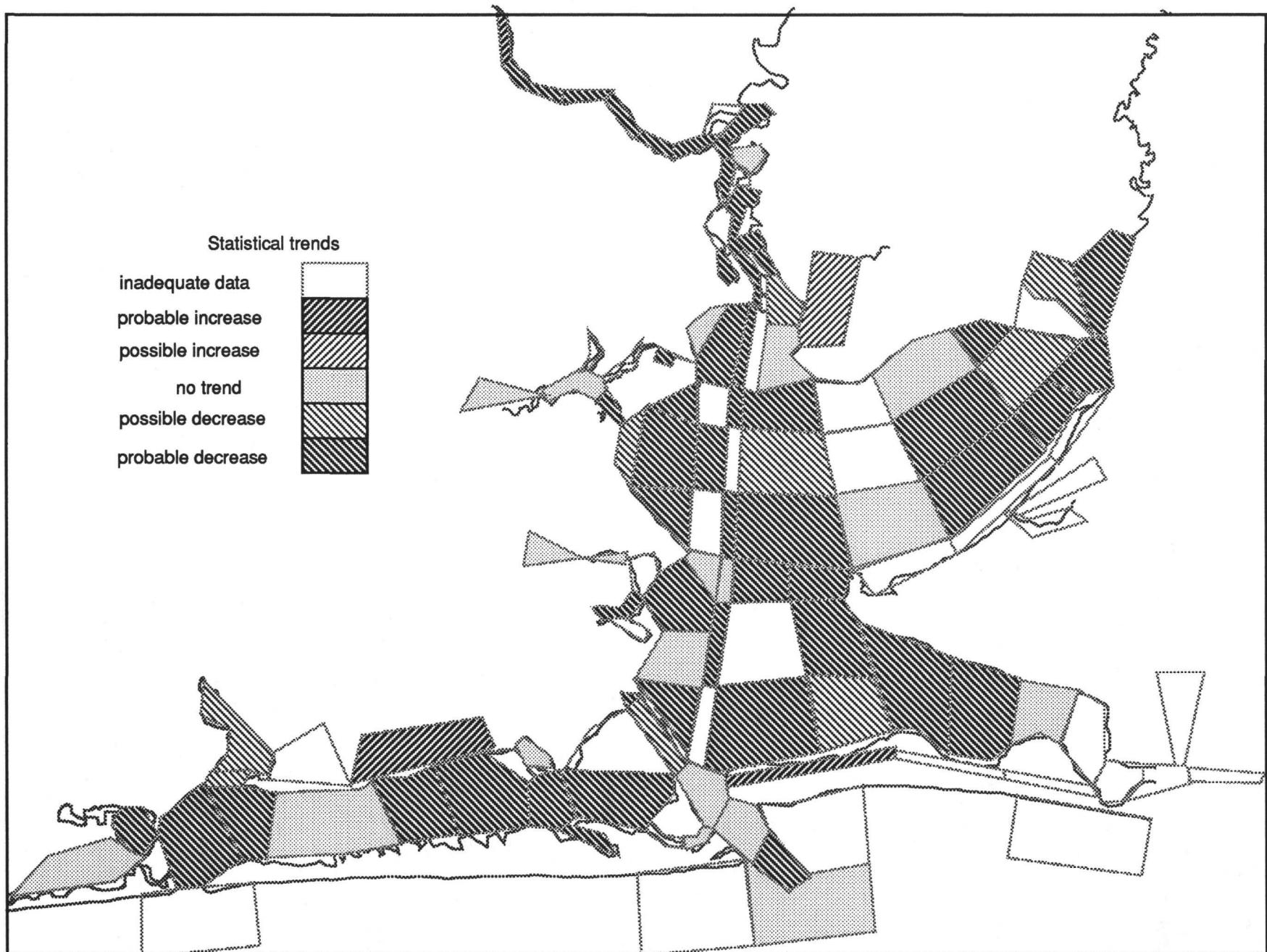


Fig. 5-45 Statistical trends over period of record of WQTOTP in Galveston Bay

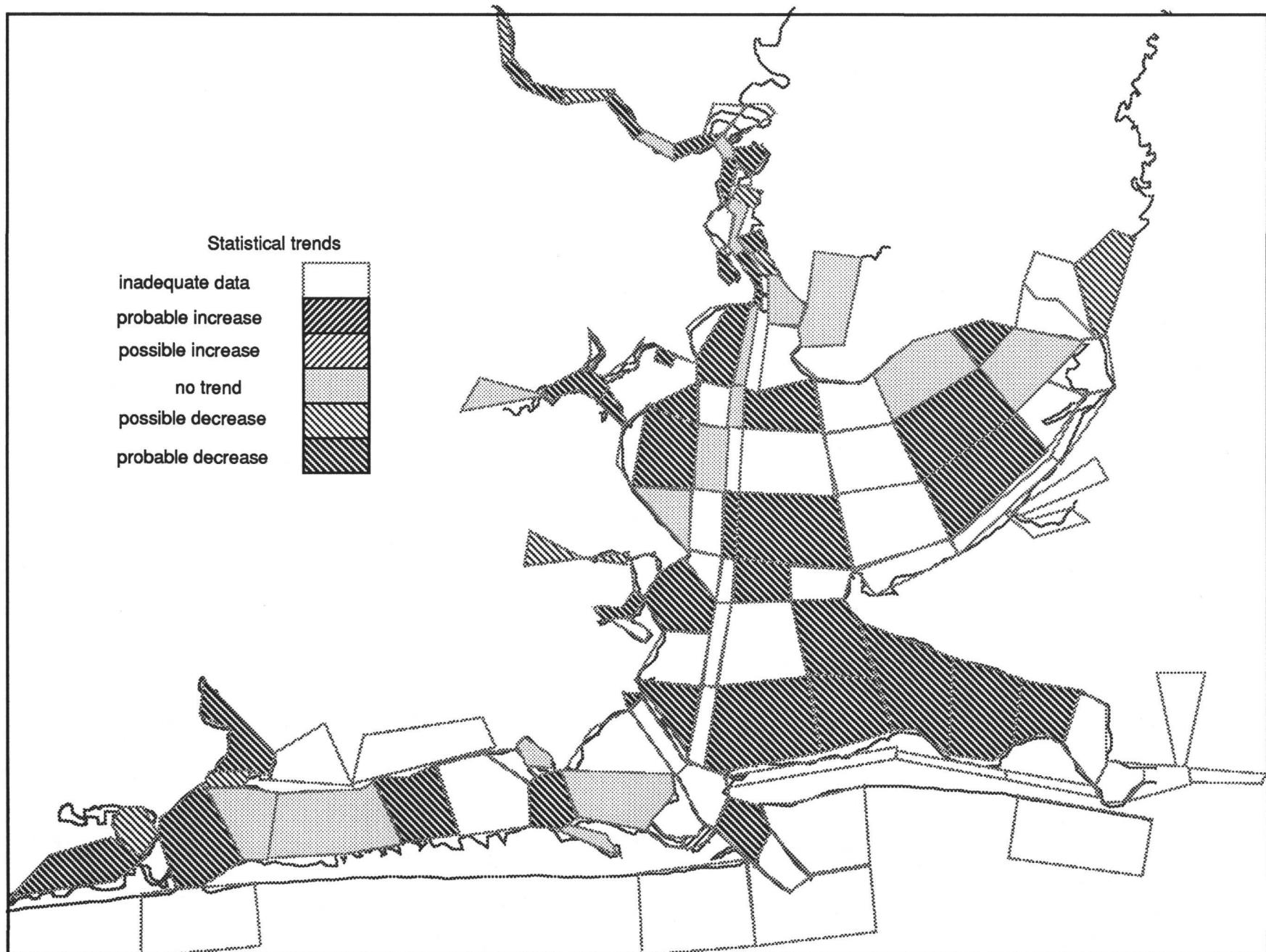


Fig. 5-46 Statistical trends over period of record of WQCHLA in Galveston Bay

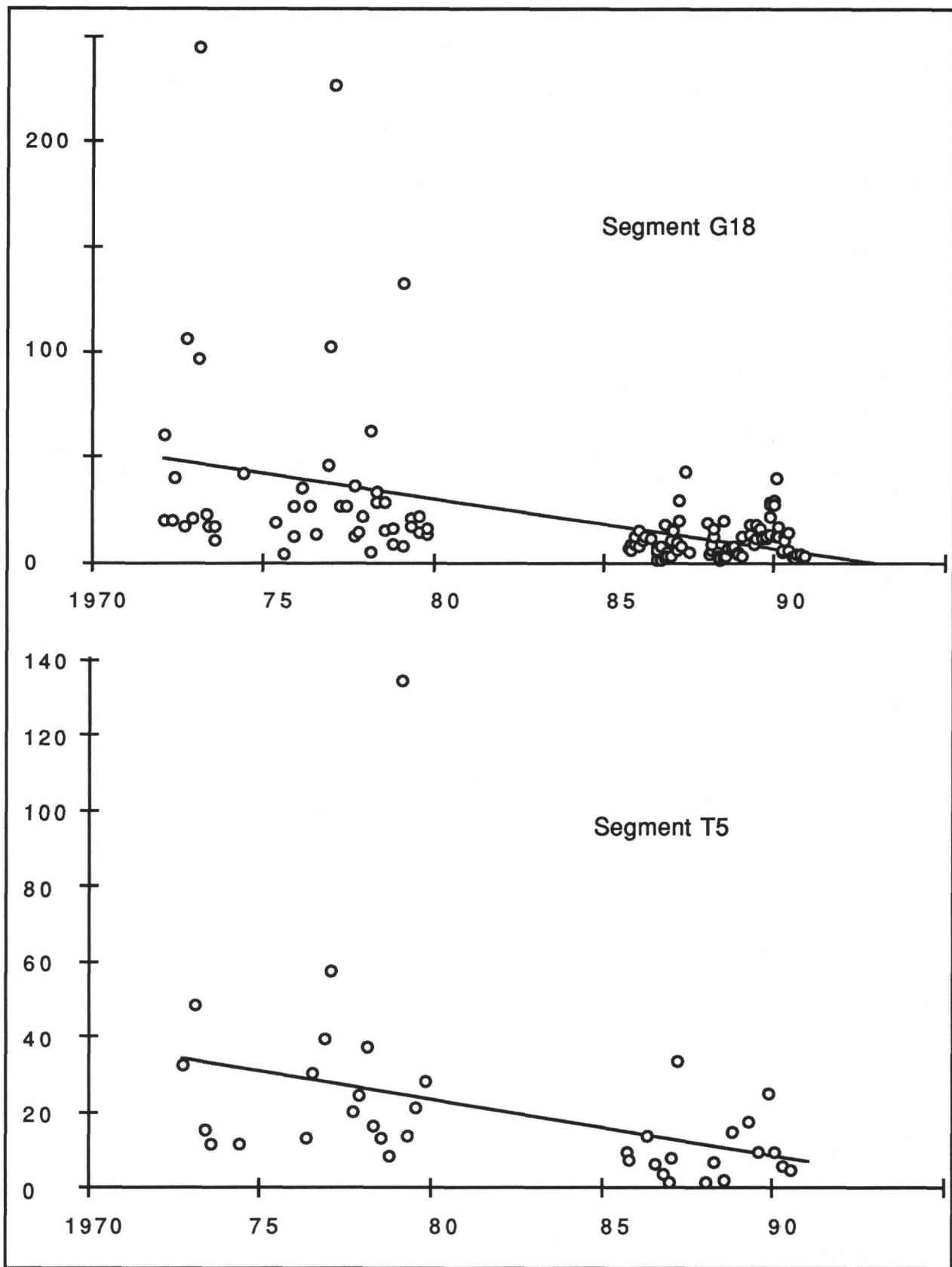


Fig. 5-47 WQCHLA trends Galveston Bay (G18) and Trinity Bay (T5)

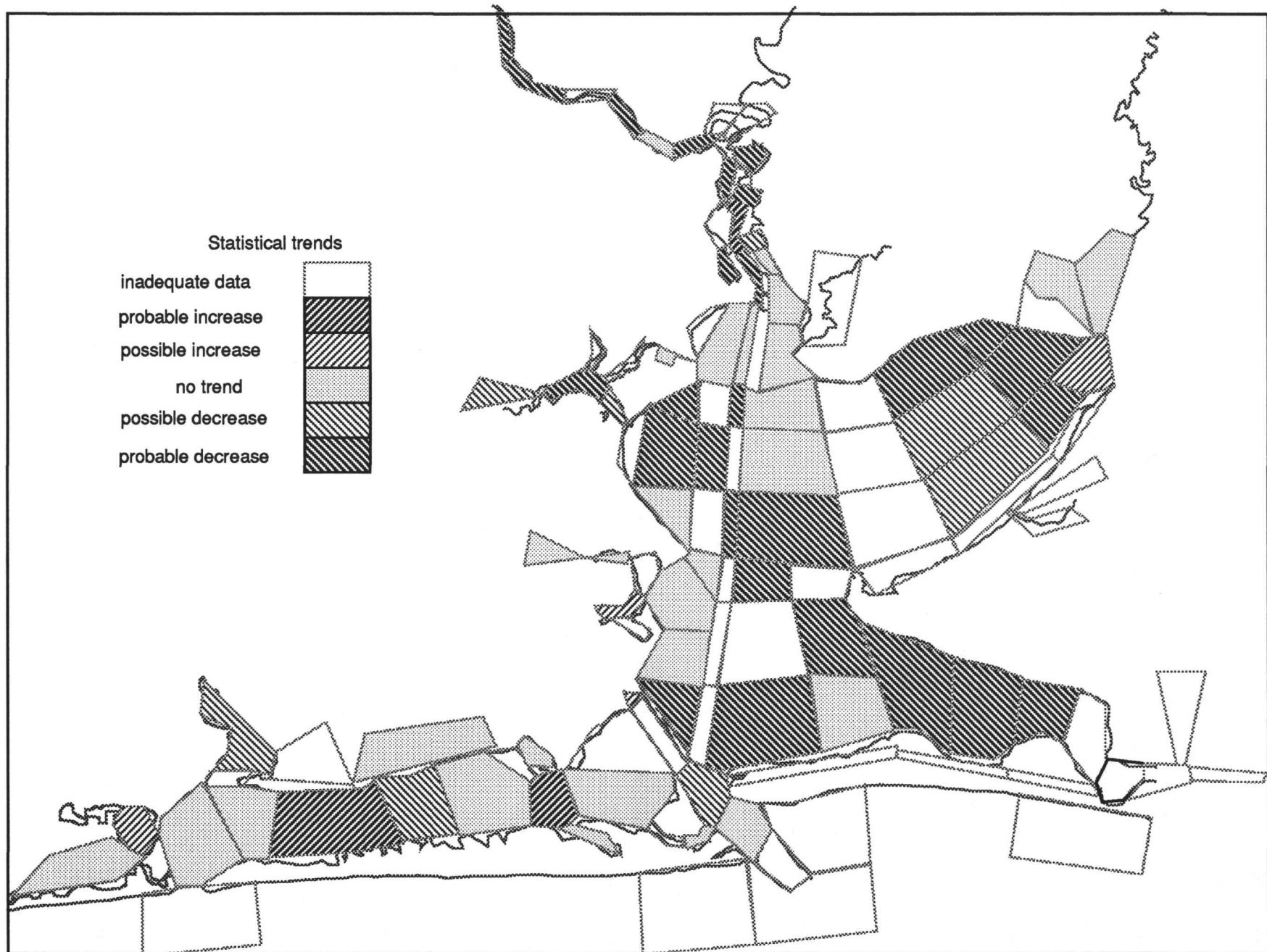


Fig. 5-48 Statistical trends over period of record of WQTOC in Galveston Bay



Fig. 5-49 Statistical trends over period of record of WQTCOLI in Galveston Bay

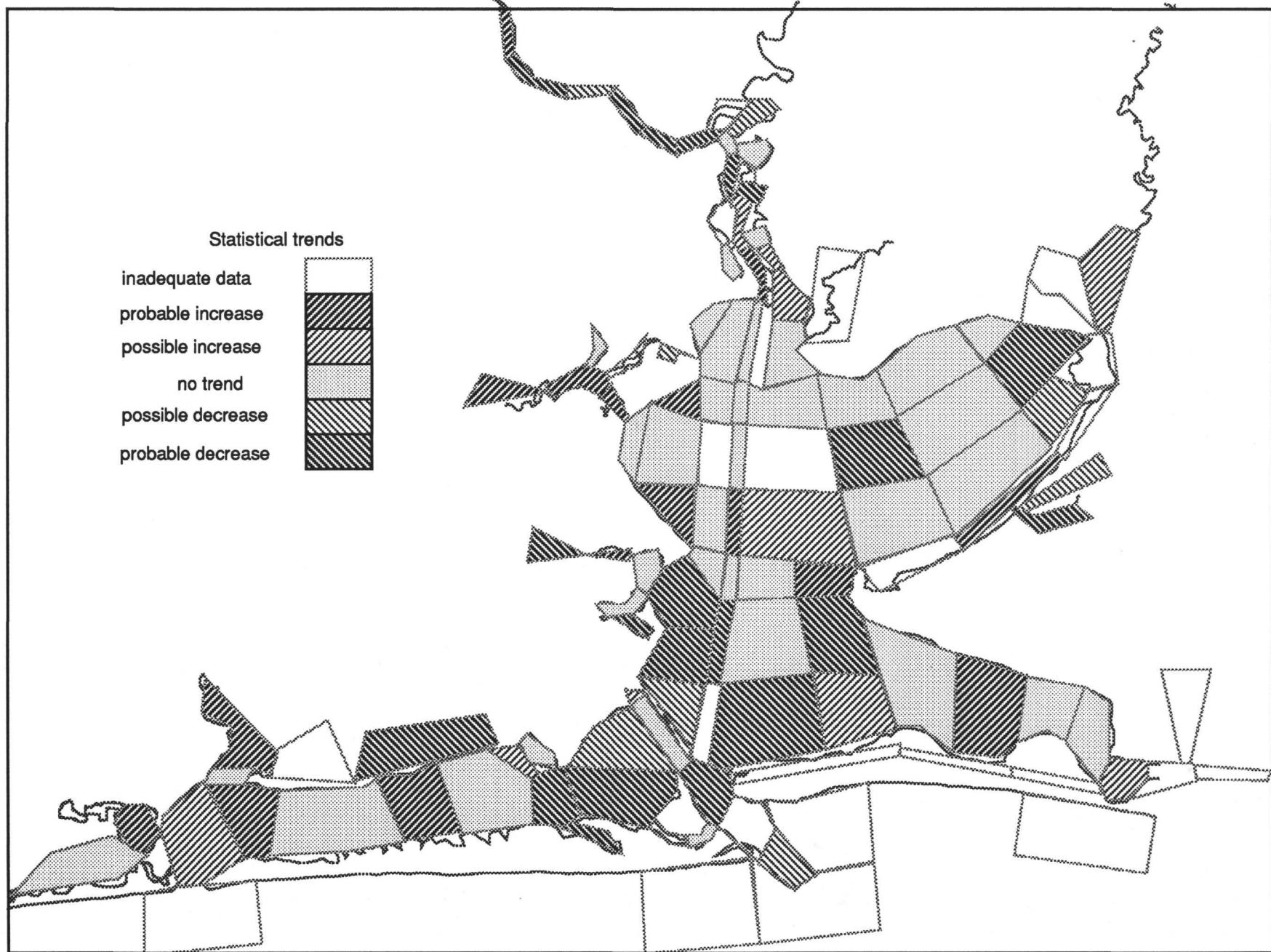


Fig. 5-50 Statistical trends of base-e logarithms of WQTCOLI in Galveston Bay

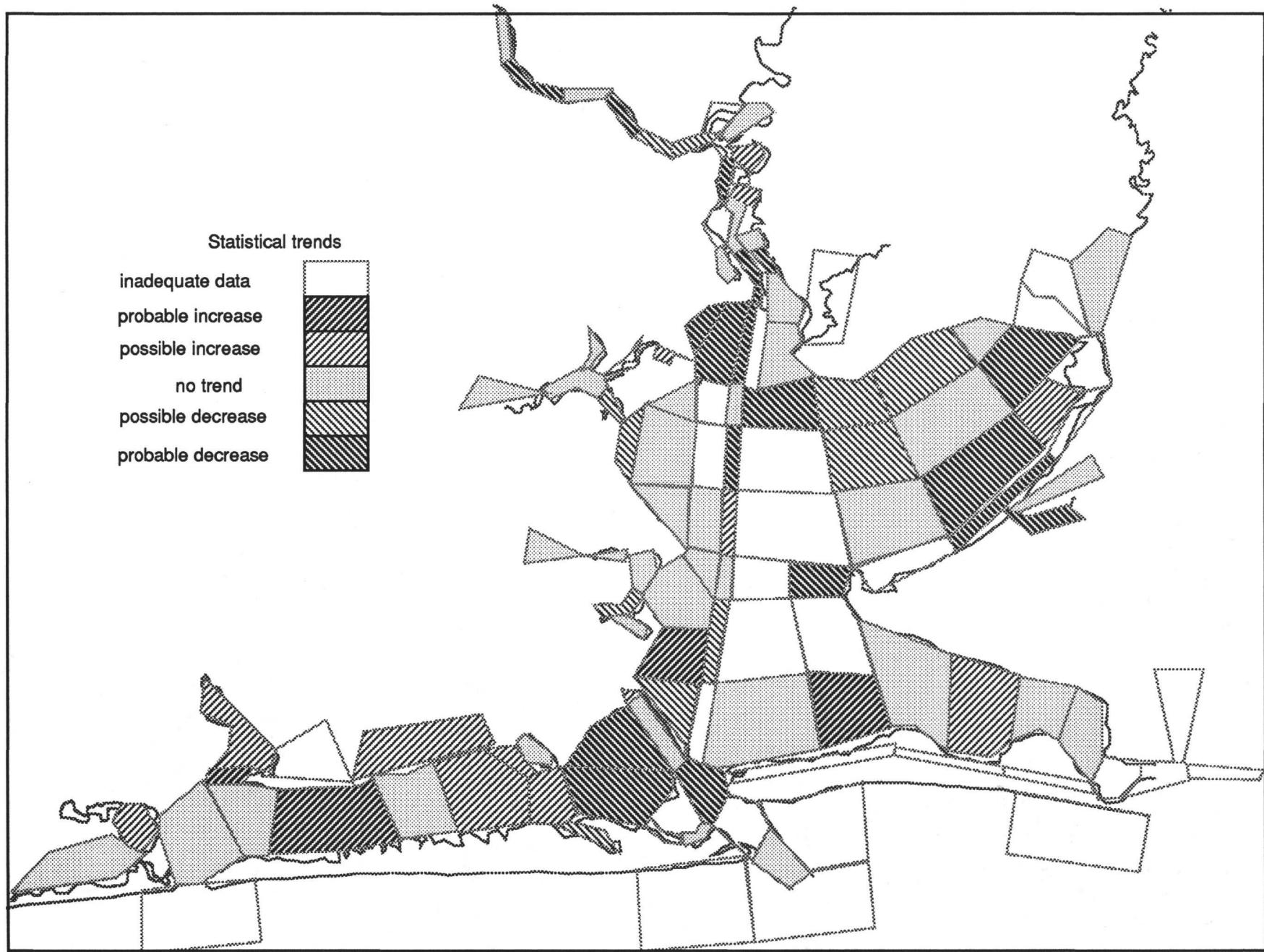


Fig. 5-51 Statistical trends over period of record of WQFCOLI in Galveston Bay

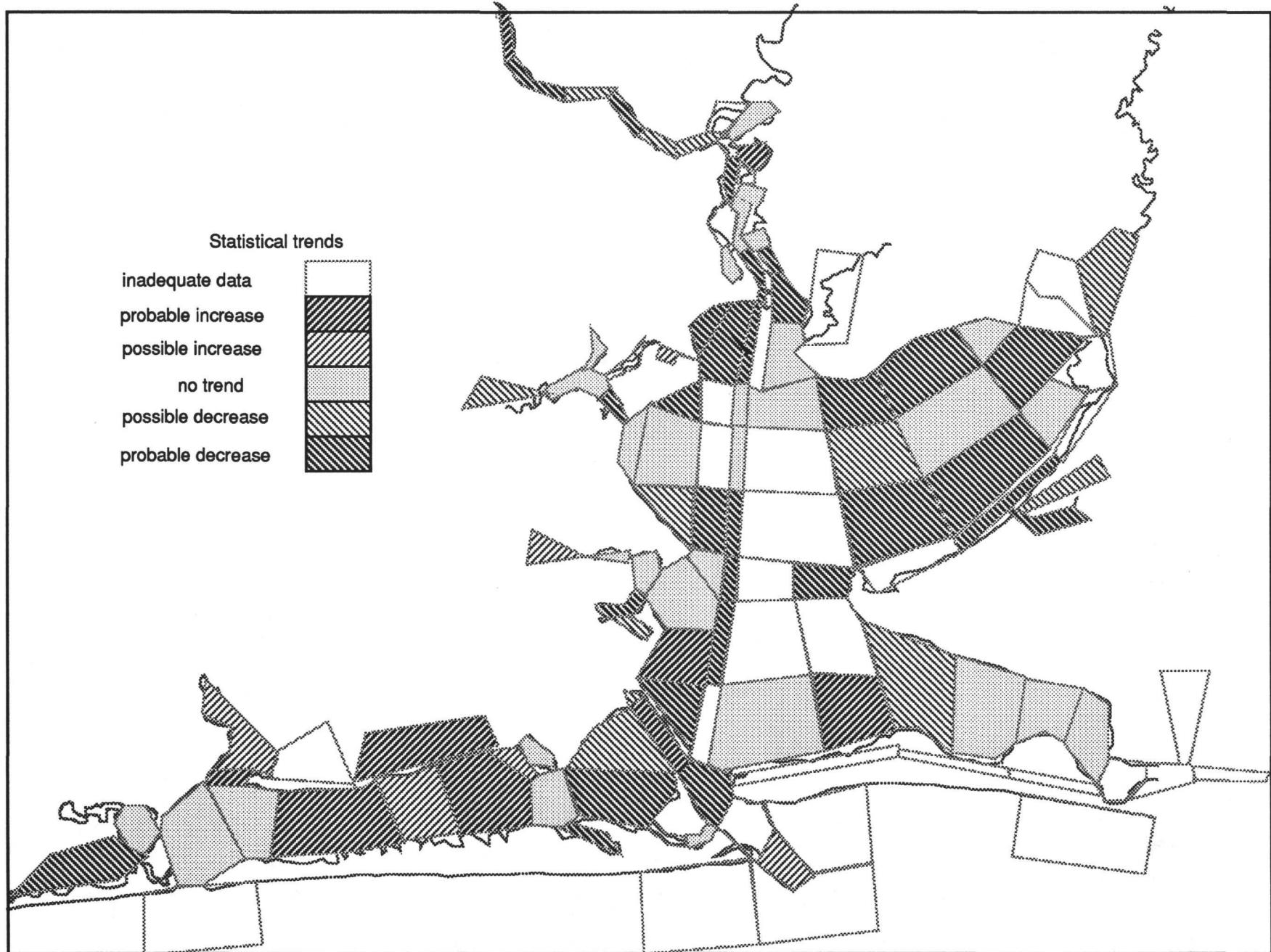


Fig. 5-52 Statistical trends of base-e logarithm of WQFCOLI in Galveston Bay

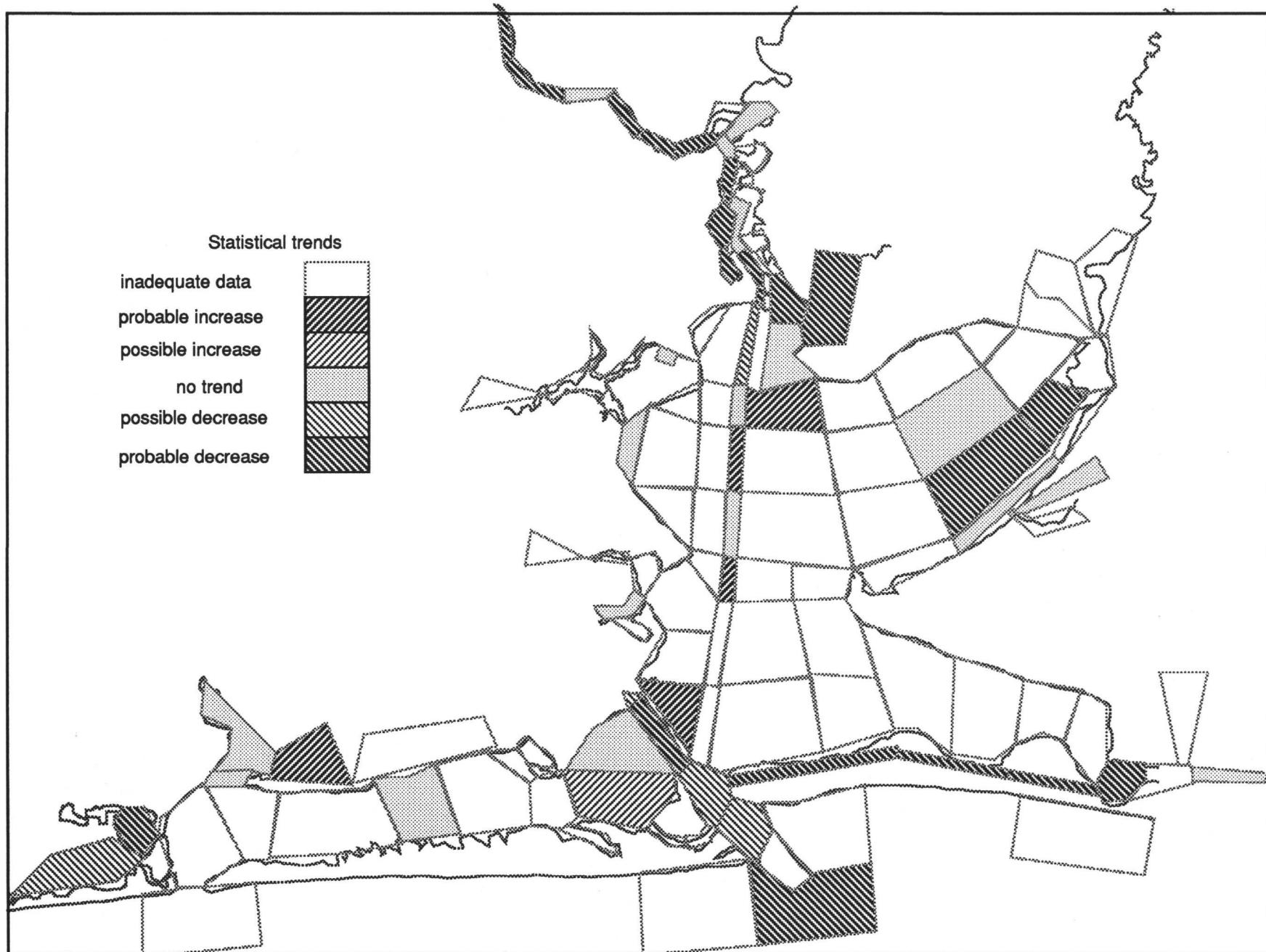


Fig. 5-53 Statistical trends over period of record of WQMTCU in Galveston Bay

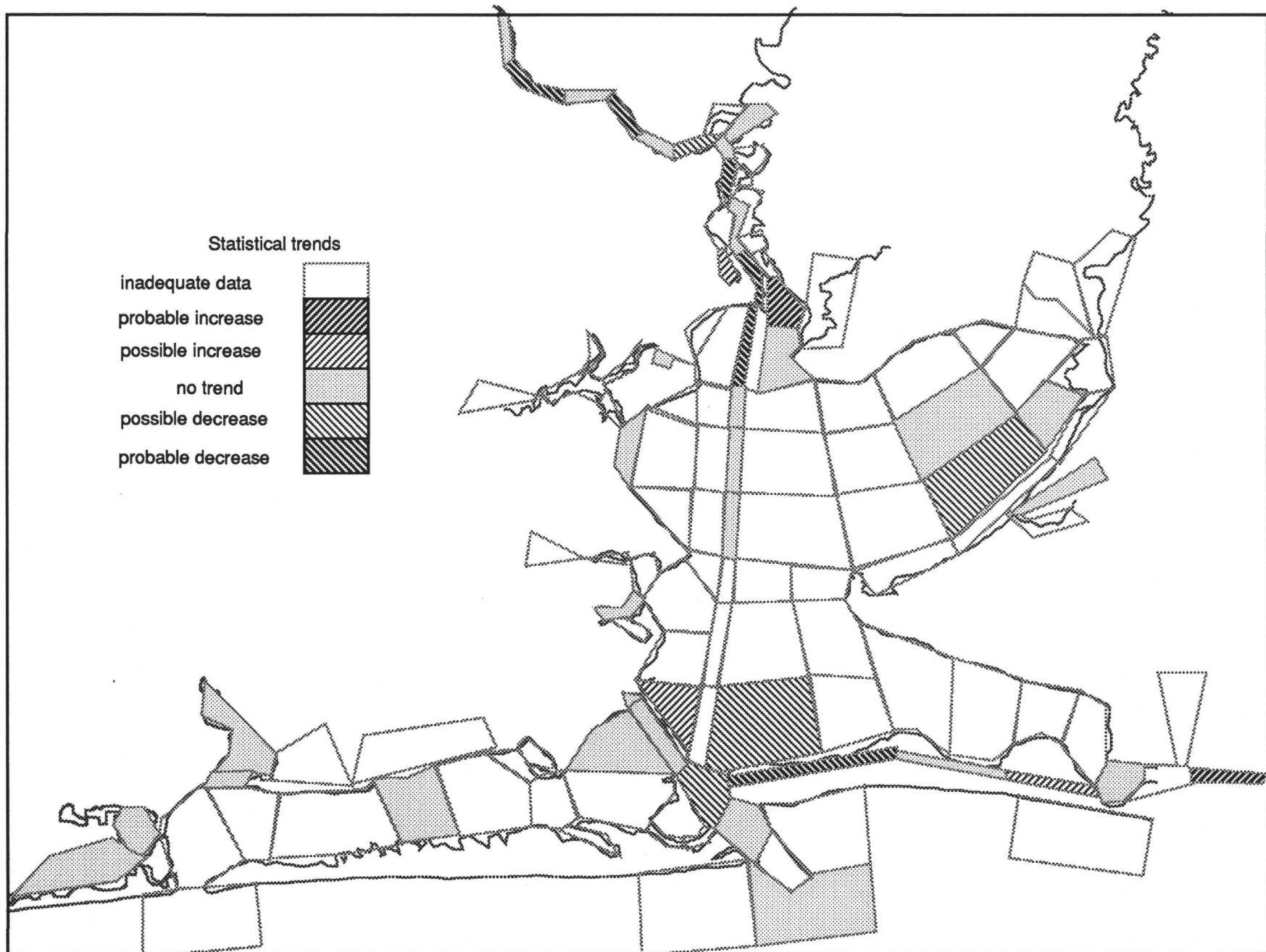


Fig. 5-54 Statistical trends over period of record of WQMTPBT in Galveston Bay

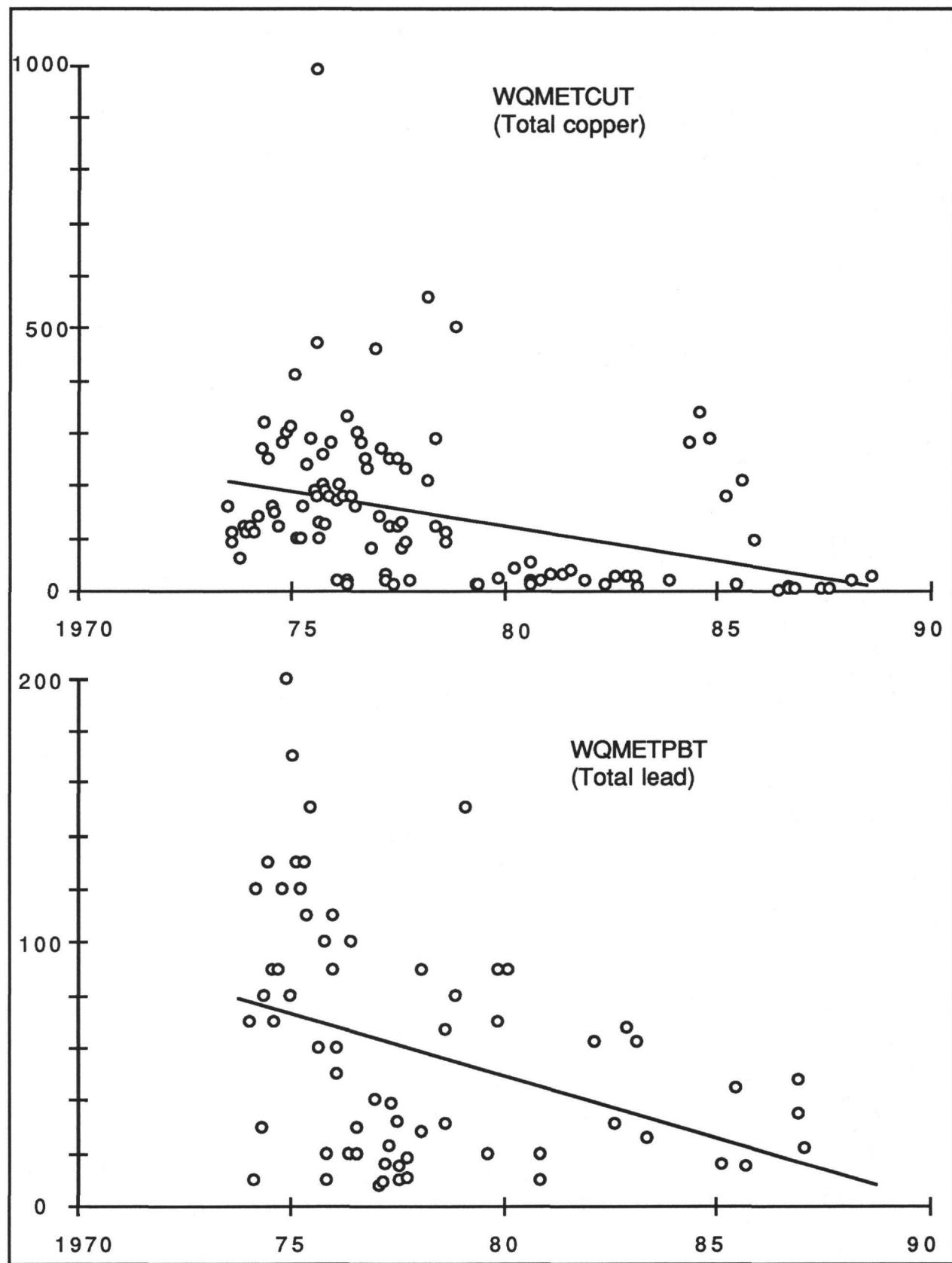


Fig. 5-55 WQMTCUT and WQMTPBT trends in upper Houston Ship Channel (H17)

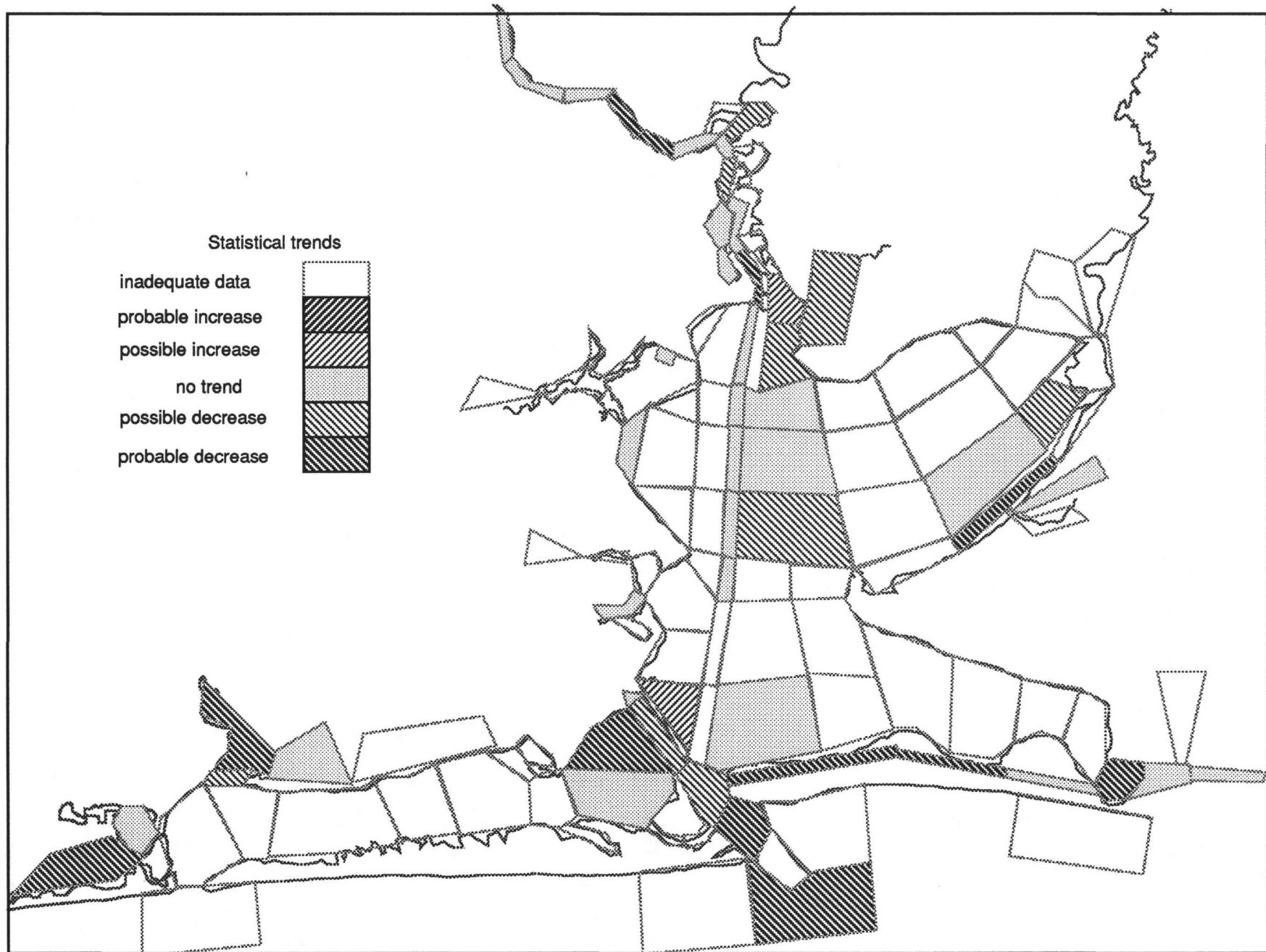


Fig. 5-56 Statistical trends over period of record of WQMETZNT in Galveston Bay

5.3 Observations

Water temperature is generally homogeneous throughout the bay, varying generally less than 1°C in summer and 2°C in winter over the open bay. (The variability manifested in Figs. 5-1 and 5-2 may be as much due to varying sampling density and periods of record as to real variation.) The tributaries tend to be slightly warmer than the open bay in both winter and summer. Stratification (Table 5-14) is noisy and not well-developed, generally averaging less than 0.3 °C/m, with most open-bay and Houston Ship Channel stations less than 0.1°C/m. For the past two-three decades, there has been a general decline in water temperatures, especially in the open-bay segments, driven primarily by the warm-season temperatures (Fig. 5-25). Averaged over all segments with a probable negative trend, this decline is roughly -0.06 °C/yr.

Salinity is, of course, the central hydrographic and habitat variable of Galveston Bay. Long-term average salinities exhibit a landward decline toward the sources of inflow (as expected), Figs. 5-3 and 5-4, with the largest horizontal gradient from Red Fish Bar across Trinity Bay. The Trinity plume along the south shore of Trinity Bay, the slightly higher salinities in the open (mid-bay) reach of the Houston Ship Channel, and the generally more saline conditions of West Bay are well-known features of the salinity structure that are quantified by the long-term averages of Figs. 5-3 and 5-4. Average salinity stratification (Table 5-15) is remarkably uniform through the bay, given its noisy character, and is less than 0.6 ‰/m almost everywhere except near points of freshwater inflow, and less than 0.3‰/m throughout about half of the area of the bay. There is no dependence of stratification on water depth evidenced in the long-term averages. Over the period of record, dating back in some segments to the early 1950's, there has been a declining trend in salinity, especially in the late summer values (Fig. 5-28). The mean rate of decline, averaged over those segments with a probable negative trend (e.g., Fig. 5-29), is about -0.18‰/yr.

As expected, pH varies slightly from values in excess of 8 in the open, more saline segments of the bay, to values less than 8 near points of inflow, Fig. 5-5. No meaningful trends in pH were evident, Fig. 5-34, in that the probable trends exhibited little spatial coherence.

Average dissolved oxygen concentrations in the open bay are uniformly high, Fig. 5-6. The lowest mean DO values (highest deficit values) in the system are found in the confined reach of the Houston Ship Channel (i.e., upstream from Morgans Point). Stratification is evident (Table 5-16), on the order of 0.2 ppm/m in the Houston Ship Channel (both confined and unconfined reaches) and in West Bay, and on the order of 0.4 ppm/m in the open segments Galveston Bay, including Trinity Bay. Inspection of Tables 5-16 and 5-17 discloses that the stratification in DO deficit dominates DO stratification, that is, the vertical variation in salinity and temperature have an at-most secondary effect on vertical DO variation. The mean distribution of DO deficit, Fig. 5-7, indicates that near-saturation conditions are the rule throughout the system, except in the tributaries. Most egregious of the tributaries is the upper Houston Ship Channel, where mean deficits range

almost to 7 ppm. DO deficit stratification is minimal as well in the upper Houston Ship Channel. In this area, the DO climate has been gradually improving, with a negative trend in deficit since the early 1960's, e.g. Fig 5-32, on the order of 0.1 ppm/yr, and even higher near and downstream from the Turning Basin. In contrast, a few areas of the open bay exhibit increasing trends in deficit, Figs. 5-30, 5-31 and 5-33. The average increase over all segments with a probable positive trend is 0.12 ppm/yr.

The concentrations of total suspended solids generally increase toward points of inflow, and there are maxima also in Bolivar Roads and in East Bay near Rollover Pass, Fig. 5-8. Stratification in TSS is pronounced, and decreases upward, Table 5-18. The most remarkable feature of TSS in Galveston Bay is the declining trend throughout the bay and tributaries, with virtually all open bay segments showing either probable or possible negative trends, Fig. 5-35. WQXTSS is a proxy variable, dominated by determinations of TSS and turbidity. These components of the data were examined separately, and each found to exhibit this pattern of declining trends. Example time trends from specific segments throughout the system are shown in Figs. 5-36 through 5-38. The mean rate of decline, averaged over those segments with a probable negative trend, is -2.1 ppm/yr. Measurements are spottier for the volatile component of the suspended solids, but VSS appears to be fairly uniformly distributed (Fig. 5-9) with a declining trend (Fig. 5-39), though its noisy character and sparse data render this trend less certain than that of TSS. Data on oil and grease are much more limited, with many areas of the bay unsampled. Of those regions sampled, the largest systematic concentrations are found in the vicinity of Texas City, Fig. 5-10.

The spatial variation of BOD exhibits an expected pattern of uniformity in the open areas of the bay and increases toward regions of waste discharge, Fig. 5-11. The largest mean values are in the upper Houston Ship Channel. We note the elevation in BOD along the northern shore of Trinity Bay. Generally, there is no systematic time trend in BOD in the open bay segments, but there are probable declines in BOD in Clear Lake, Dickinson Bayou, Cedar Bayou, and—especially—in the upper Houston Ship Channel (Fig. 5-41). Example regressions for two of the upper Channel segments are shown in Fig. 5-42. Averaged over all segments with a probable negative trend (70% of which are in the upper Houston Ship Channel), the mean decline in BOD is -0.27 ppm/yr.

Two of the principal nutrients, nitrogen and phosphorus in their various forms, play an essential rôle in aquatic biological processes. Further, their concentrations can be significantly augmented by the activities of man, especially through point discharges of municipal and industrial wastes, and through runoff from modified watersheds. While nitrogen exists in four principal species, not all of these are routinely measured. Ammonia is fairly uniform through the open bay, generally less than 0.1 ppm, and much higher in the tributaries, especially the upper Houston Ship Channel, Fig. 5-12. Nitrate follows a similar general pattern (with enough segment-by-segment departures to erode the correlation, Table 5-26). Ammonia and nitrate exhibit the same general patterns in stratification, Tables 5-22 and 5-23, with negative stratification (decrease of concentration from bottom to surface) in the open bay segments and positive

stratification in the upper Houston Ship Channel. The magnitude of the vertical stratification, of either sign, is small. Many areas of the bay show an uncertain time trend in ammonia, but where there are trends they tend to be declining. For the segments with a probable negative trend, the average rate is -0.11 ppm/yr. Nitrate exhibits a tendency to decrease in the open bay, but to increase in the tributaries. Averaged over those segments with probable positive trends, the rate of increase of nitrate is 0.061 ppm/yr. This opposite trend of ammonia and nitrate should especially be noted in the upper Houston Ship Channel and Clear Lake, Figs. 5-43 and 5-44.

The more common measures of phosphorous concentration are orthophosphates and total phosphorus. Generally, the latter is predominant in the Galveston Bay data, hence was selected as the principal measure of phosphorous for analysis. One significant source of uncertainty in this measurement is the treatment of particulate (versus dissolved) phosphorus. Phosphorous is sorptive and has an affinity for fine-grained suspended sediments. In some of the data sets, it is not clear whether the total-phosphorous analyses are restricted to the dissolved fraction (i.e. whether the sample is filtered) or includes the particulate. Total phosphorus increases from average values on the order of 0.1 ppm at the inlets of Galveston Bay to 1.0 or greater in regions of waste discharges, especially the upper Houston Ship Channel, Fig. 5-14. There is a predominant declining trend in total phosphorus in the open bay and the Houston Ship Channel, Fig. 5-45. Averaged over all segments with a probable negative trend, the rate of decline is -0.043 ppm/yr.

Although there are significant areas of the bay that are not sampled for chlorophyll-a and total organic carbon, for those where there is an adequate data base, both parameters show declining trends over the period of record, Figs. 5-46 through 5-48. Averaged over those segments with a probable negative trend, the mean decline in chlorophyll-a is -1.7 ppb/yr and in total organic carbon is -0.50 ppm/yr. TOC shows no systematic stratification, Table 5-24, and chlorophyll-a tends to be positively stratified in the Houston Ship Channel, Table 5-20, which is virtually the only area of the bay in which vertical sampling has been performed.

Generally, both coliform measures, both as arithmetic and geometric means, display elevated levels around the periphery of the bay, minimum values in the mid-segments of the open bay, and largest concentrations at points of inflow and waste discharge. The highest concentrations are in the upper Houston Ship Channel, and the lowest in the midsections of Trinity Bay, Lower Galveston Bay, East Bay and West Bay. In some instances, e.g. the Trinity River and delta, an elevated level of total coliforms does not correspond to an elevated level of fecal coliforms. The time trends for the two coliform measures are different, Figs. 5-49 through 5-52. Total coliforms show little coherency in trend, except declining trends in lower Galveston Bay, eastern West Bay, and the upper Houston Ship Channel, which are even more magnified by the logarithmic transform (Fig. 5-50). Fecal coliforms, in contrast, show little coherency in the main section of Galveston Bay and in East Bay, but exhibit coherent declines in Trinity Bay and the middle region of West Bay. While fecals show some decline in the upper Channel and around Pelican Island, the extent is not nearly as pronounced as for

total coliforms. Again, these trends are magnified by the logarithmic transform (Fig. 5-52).

Most areas of the Galveston Bay system have an inadequate data base for metals, and even less data for organic compounds. The general distributions of total copper, lead and zinc are shown in Figs. 5-20 through 5-22. In each instance, elevated levels are indicated in the upper Houston Ship Channel and on both sides of the Texas City Dike. High mean concentrations of copper occur in mid-Trinity Bay and mid-East Bay. High concentrations of lead and zinc occur in lower Galveston Bay just inside the inlet (i.e., around the flood bar). Data is even sparser on trends, Figs. 5-53 through 5-56, but where trends are indicated, they are almost everywhere negative. (The increasing trend of metals in the segment north of the Texas City Dike lacks validity because it is based upon a few measurements in 1974-75.)

The best-monitored pesticide is DDT, and the greatest data base is that assembled by proxying the principal isomer, Fig. 5-23. Even at this, most areas of the bay do not have data, and those segments which do are most often below detection limits (counted as a value of 0 in Fig. 5-23). Where non-zero values occur, they are in areas affected by inflow and waste discharges, *viz.* the Houston Ship Channel, Clear Creek, and Texas City Turning Basin. The zero (BDL) concentrations in the San Jacinto, Chocolate Bay and Cedar Bayou should be noted. (The large value in mid-West Bay may be the result of a spurious data entry.) No time trends could be computed.